THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVI. No. 1701.] LONDON, DECEMBER 17, 1895. [47TH YEAR. PRICE 6d.

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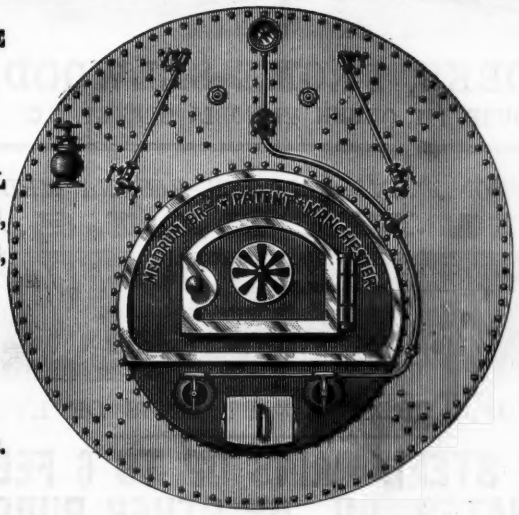

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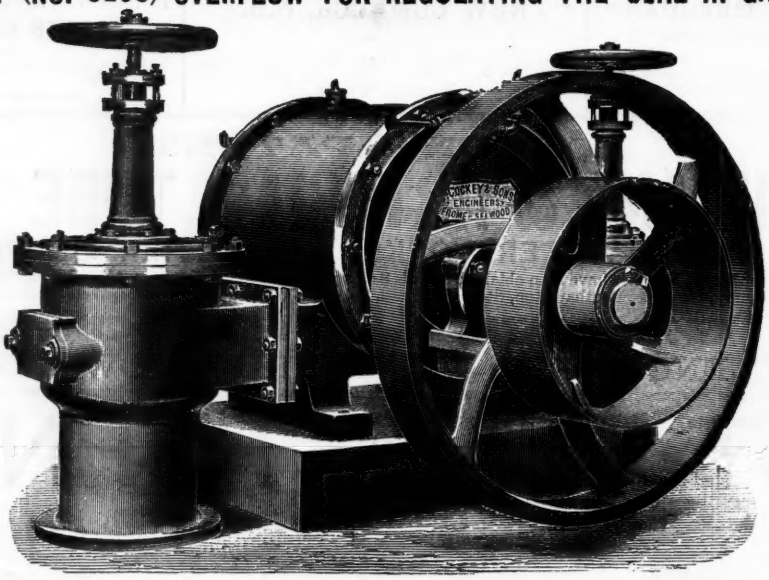

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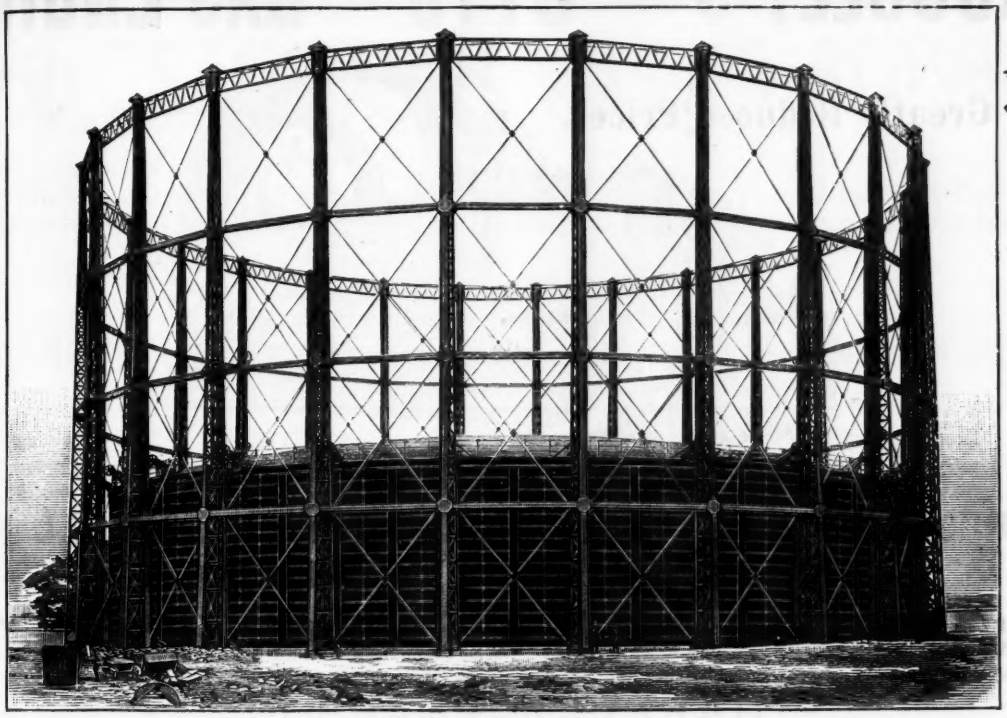

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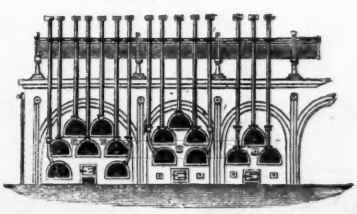

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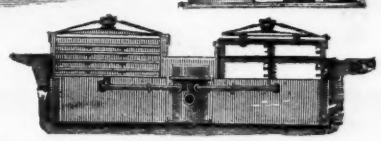

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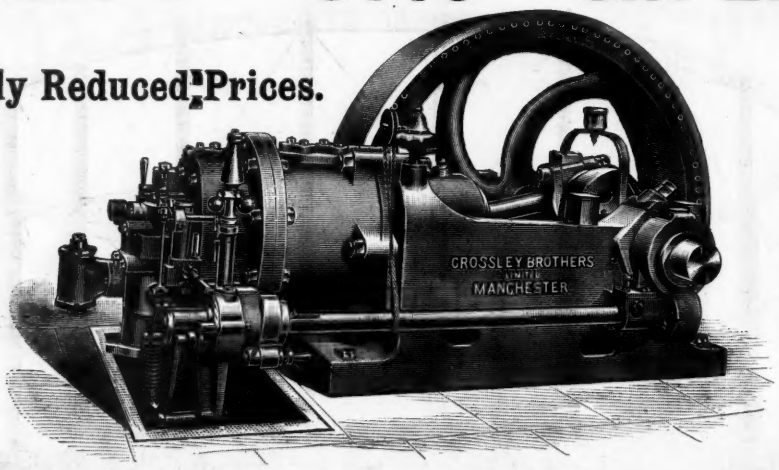

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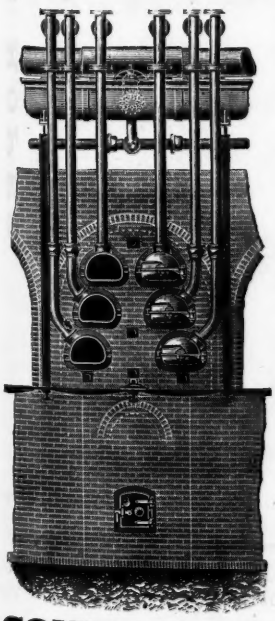

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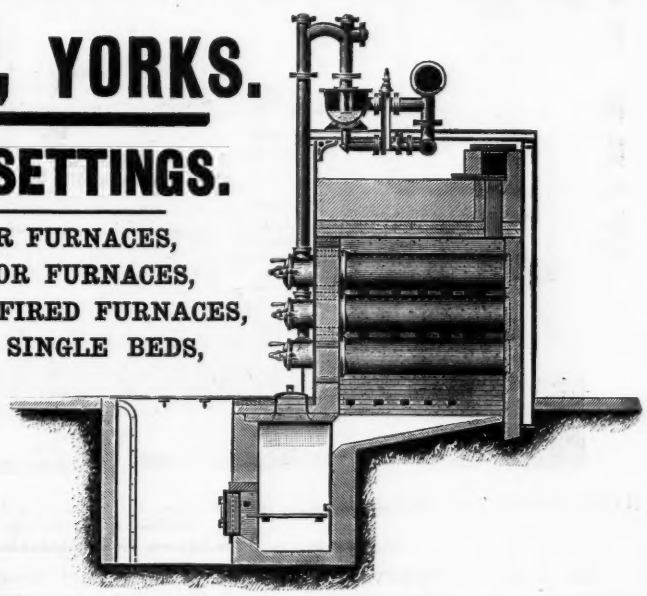

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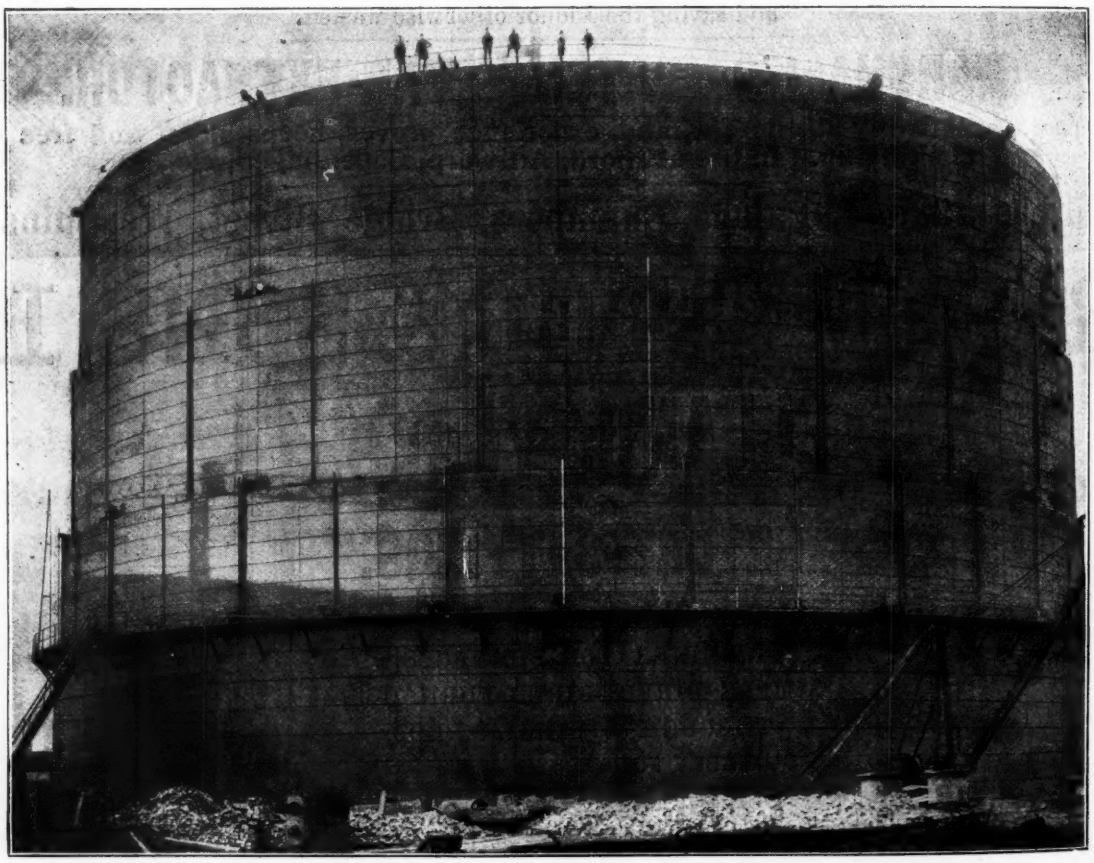

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References to American and other Users.

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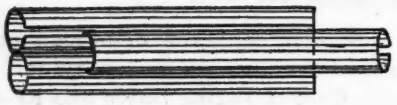

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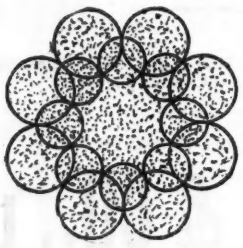

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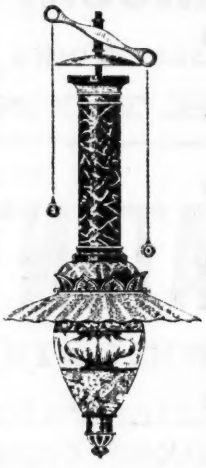

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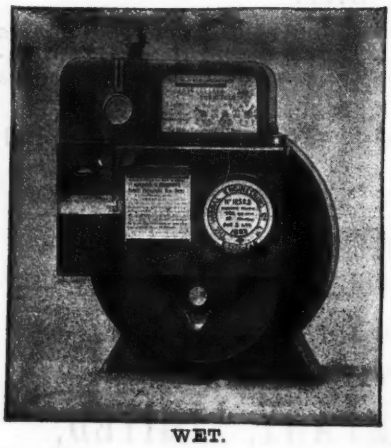

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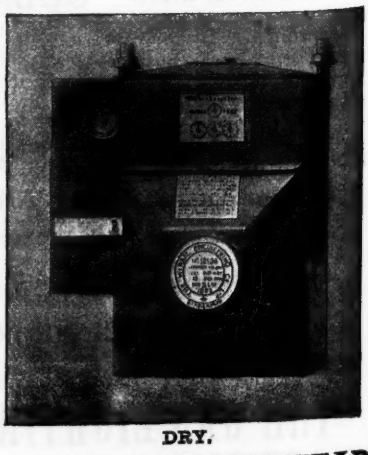

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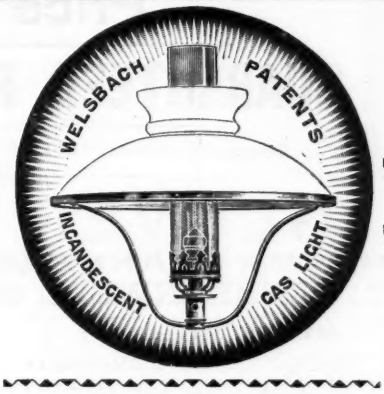

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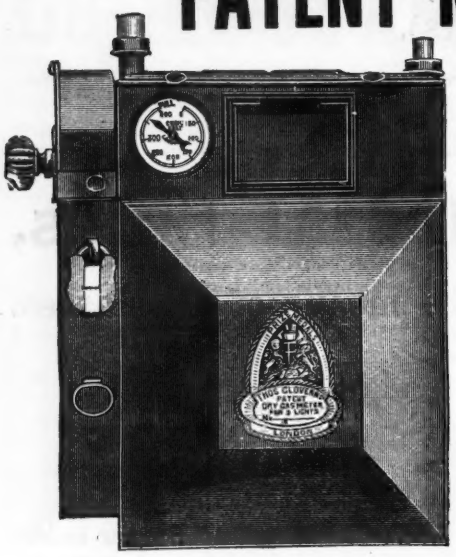

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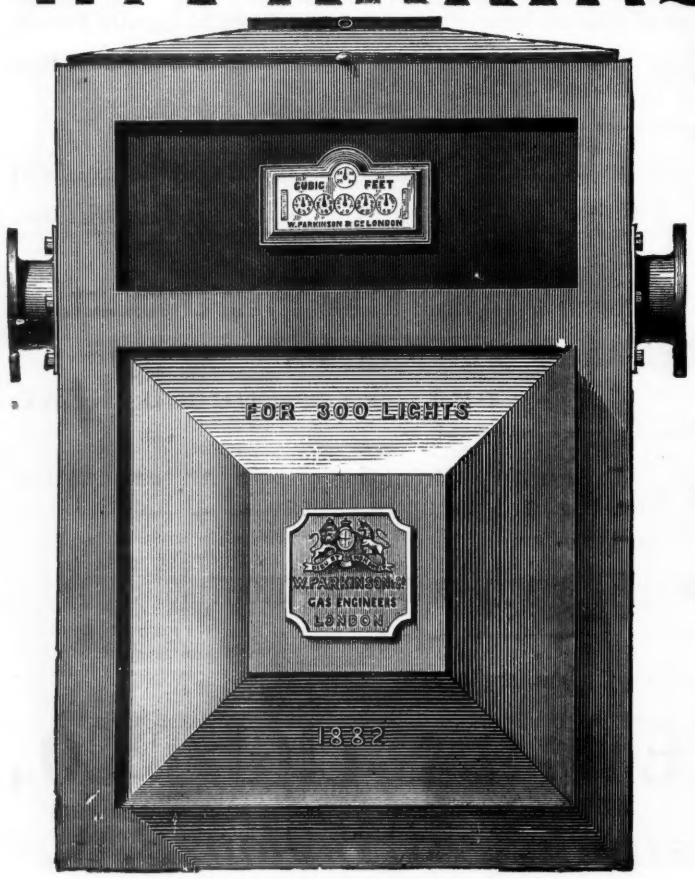

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THE "JOURNAL" OFFICES.

The rebuilding of the "Journal" Offices having been completed, the Editorial and Publishing Departments have been transferred from Temple Chambers and No. 1, Gough Square, to No. 11, BOLT COURT, FLEET STREET, E.C. Correspondents and friends calling will kindly note that this will in future be the ONLY ADDRESS for "Journal" business.

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EDITORIAL NOTES.

The Preparation for Good Work.

THE Duke of Devonshire and Mr. Chamberlain were last week in Birmingham together, the auspicious occasion being the opening of new buildings for the Municipal Technical School—an enterprise which is doubtless, at least in part, supported out of the profits of the Corporation gas undertaking; thus realizing to a certain extent aspirations which form the subject of another paragraph of these editorial notes. We do not notice the opening of the Birmingham school building on this slender account, however, but because, in officiating on this occasion, His Grace of Devonshire delivered himself of some reflections upon the subject of education of that sterling quality which the British public has learnt to expect from this most solid of statesmen, whatever the subject upon which he speaks. We often hear about the strain and stress of the competition to which British industry is subjected; and probably there is no industrial centre in the kingdom more powerfully stimulated by this pressure than Birmingham, or less favoured now by natural advantages for withstanding it. The trade of Birmingham was once helped by cheap local supplies of coal and iron; but at present most of the raw materials worked up in the town and its vicinity are of "foreign" origin. Consequently, it is simply the men of Birmingham that give the city whatever superiority it may possess as a source of commodities capable of commanding a paying price in the markets of the world; and the Corporation, by their schools, are doing all that can be done to increase the efficiency of the splendid local breed of working people.

When one talks of schools, and especially of the operation of the Elementary Education Act, one is very apt, if a person of technical training, to question whether, as generally administered, this universal schooling really effects its proper purpose. There is more than a suspicion in the public mind that the character of the schooling received by the mass of the rising generation is not suited for them, inasmuch as it tends to turn the most promising boys and girls from following handicrafts, and predisposes them to join the ranks of the non-producers. The Duke of Devonshire is clearly one of those who entertain this view. "Too "long, in my opinion," he said in Birmingham, "it has "been the tendency of our educational system, from its "too literary character, to make the student who has dis-"tinguished himself imagine that he has become too good "merely to labour with his hands, and that it is necessary for "him to aspire to some class of work other than that of the "work of his own hands. That is a position which I emphati-"cally desire to repudiate." It is to be hoped the Duke will be able to use his official position to destroy this tradition of pedagogy, which requires the rates to be spent in turning the son of the good bricklayer into an indifferent mercantile clerk, and the daughter of the expert workwoman into a type-writer. What is wanted is to put the child of the unskilled labourer in the way of becoming a skilled workman, and to enable the tradesman's son to excel his father. Our engineers are inventing, adapting, and applying the discoveries made by our men of science, and redeeming the conquests of our pioneers. They need foremen and good hands to work the improved apparatus which they are giving civilized nations. As the Duke of Devonshire, and following him Mr. Chamberlain, said in Birmingham, the unskilled—the merely mechanical—workman will be rendered obsolete before very long. The future is with the skilled hand; but this will have to be accompanied and guided by the instructed and educated mind. We do not want the type of skilled workman who is just at present unhappily too familiar a figure—the man who can do his work well when he likes, but has a brain so little cultured that he is as clay in the hands of the glib agitator who has had the wit to pick up a few German socialistic notions, and possesses the "gift of the gab" for expounding them. The country wants workmen who are wise enough to make friends with machinery, and are expert and careful enough to make a machine yield its utmost—not fools like those who would drive every industry out of the country rather than give up the "union stroke."

Incidentally, the Duke of Devonshire described the operation of the much-vaunted German system of technical training, and showed how it eventuates in a caste system as rigid as that of India. The advanced schoolboy may

pass from one educational establishment to another; but the workman must always remain a workman. There is no graduated instruction for him. He takes his orders, like a soldier on parade, and executes them. The English employer notoriously has a preference for the foreman or head of department who has risen from the ranks of labour. This weakness for "the practical man" is greatly resented by our own highly-schooled youth, who are often heard to complain that, after all their expensive training, they are not wanted for the posts they would like to fill. The remedy seems to lie in the direction discussed by the Duke of Devonshire. The country and the employer want the practical man; but why should he not also be an educated and instructed man?

In the ranks of the gas industry, we hear of a host of aspirants to managerial or sub-managerial positions, which are not easy to obtain, and are not over-well paid at that. We are not going to enter into this part of the question, but only allude to it in passing by way of introducing the observation that many a young man, who would fain be a gas manager, had far better shun the drawing office and the books, and get a berth as main-layer, or as attendant on a stoking-machine. He can keep up his drawing and his other studies at the same time; and, under the system of the eight-hour shift, he will have plenty of leisure to improve himself. He must, of course, learn to possess his soul in patience until his opportunity arrives, as arrive it almost certainly will. We say "almost certainly" advisedly; for nothing is certain for any one of us but death. There is, however, as small a chance of disappointment in a life begun this way as in any other. The French proverb says: "*Tout vient à lui qui sait attendre*"—not, as in the current (and erroneous) English rendering, "Everything comes to him who waits," but to him who *knows how* to wait. A great and notable difference. We commend these words to all whom they may concern, with the advice that the counsel should be taken in connection with the drift of the Duke of Devonshire's and Mr. Chamberlain's speeches of last Friday.

The Deadlock in the Engineering Trade.

THE conference of employers and operatives concerned in the labour trouble of Glasgow and Belfast duly came off last week, as arranged, with Lord James in the chair, and resulted provisionally in the formulation of a definite offer by the employers of terms upon which engineering work in their yards might be resumed. These terms, which referred solely to the scale of wages, and made no mention of the socialistic invention of the "minimum wage" imported into the case by the men's Society, were submitted to the Belfast operatives first, and were by them rejected by an almost unanimous vote. The Greenock and Glasgow hands have followed suit; so that for the present there seems to be no prospect of the termination of the dispute by any more expeditious and less wasteful method than that of punishing one or both sides to the point of exhaustion and despair. It is a curious feature of the situation that a decision which is generally regarded as threatening to shake to its very foundations the shipbuilding industry of the regions affected, is ostensibly due to the obstinacy of a few hundreds—at any rate less than 3000 workmen belonging to a particular Trade Union. It is now recognized that, as the special correspondent of *The Times* put it yesterday, "the moment has come when the title, under "which the movements and rumours of movements on the "Clyde and the Lagan, and the consequent developments "at Barrow and on the East Coast have been recorded, "must be changed." The affair stands disclosed as a strike pure and simple, of the regular common-place type. "That the disputes on the Clyde and the Lagan were "substantially identical, there has never been real doubt; "but there has been some semblance of justification for "those persons who have persisted in describing the action "of the masters on the Clyde by the term 'lock-out in "'sympathy.' They cannot say anything of that kind "now." Hence the responsibility for prolonging the deadlock rests upon the Society men, who are evidently completely under the influence of their leaders. The net result so far is a keen disappointment to all those who saw in the willingness of the two parties to meet in conference a promise of readiness to accept any offer that might be the issue of this meeting. The truth of the matter appears to be that the conference after all was premature. The men were not so ready as their partisans in the Press assured the public, to accept any reasonable settlement which did not touch in any way their sacred right of combination. What will be said for them now that they have proved recalcitrant in face of an offer which had no reference to that sacred principle which the employers' federation was supposed to aim at destroying? It is to be noticed that the newspapers which have been foremost in denouncing the employers and backing up the men merely recorded the result of the ballots without comment. In the city itself, as may well be understood, the decision is viewed with much alarm and sorrow, as indicating the indefinite prolongation of the dispute. It would not be surprising if the next step on the part of the employers were the engagement of non-union labour.

Meanwhile, the promised independent investigation of the financial position of the Amalgamated Society of Engineers has been completed; and the assertions of those critics who have declared the organization not solvent are confirmed by it. As a writer in the *Globe* remarks, "few people have been in a position to actually realize the "extent to which its funds have been squandered, and the "truly terrible position of such of its members as may "look to it as a means of support in their old age." The actuarial calculation is based on the information contained in the last annual report of the Society, which brings matters up to the close of 1894. There is shown to be a deficiency of very nearly a million and a half of money in respect of the superannuation liability of the Society alone. To make this good would require an immediate payment from every one of the 64,188 subscribing members of £22 5s. 10d., which is, of course, an utter impossibility. Apart from this liability, the expenditure of the Society upon "trade contingencies" and "donation benefit" so jeopardizes its solvency that, to cover everything, it would be necessary to raise the annual subscriptions from £3 18s. to £8 2s. 5d. per member. And this is the state of the Trade Union that has been vaunted as the richest, best managed, and most powerful organization of the kind in existence. So far, the Executive of the Union have not taken any steps to deal with, or even to show that they are conscious of, the disastrous condition to which the Society has been brought—partly perhaps by mismanagement, but chiefly, it would appear, from engaging to do more for its members than is possible for the amount of their subscriptions.

The Judgment in the Croydon Assessment Appeal.

THE report we published last week of the judgment of the Recorder of Croydon in the matter of the appeal of the Croydon Gas Company against the increase of the assessment of their property in the borough from £11,717 to £18,343 should be carefully noted by all Gas Companies and Local Authorities. In the first place, the event was a conspicuous triumph for the appellants, who not only gained a substantial reduction from the new assessment, which, as the Recorder pointed out, they could not have obtained in any other way; but also, in consequence of their action being thus justified, the Company get their costs—a very exceptional result, and one that will go a long way towards checking future raids upon gas undertakings by the speculative professionals who make a speciality of this class of business. The fact that the Recorder of Croydon (Mr. R. G. Glenn, LL.B.) is an authority on the law of rating lends additional weight to his carefully considered judgment, which had the peculiarity of being supported by figures. It thus takes rank as a judicial monograph on the matter at issue; and it will doubtless serve for the future, as was intended, to facilitate the settlement of similar disputes without going to appeal. The "profession" already alluded to will very probably feel hugely disgusted at this spoiling of sport by the Croydon Recorder; but the larger interests affected will be grateful for this contribution to the elucidation of vexed questions that usually give enormous trouble, and run into vast expense, before they are settled. Mr. Glenn proceeded to ascertain the rateable value of the Croydon Gas Company's hereditament as follows: He found that the gross receipts, less bad debts, amounted to £78,707. The various disbursements, detailed in the judgment, made up a grand total of £38,603, which deducted from the receipts left a balance of £40,104. The amount of the occupier's share is next worked out, taking into this account five-twelfths of the cost of coal and the working expenses. Then the usual 17½ per cent. tenant's allowance is given; and the statutory

deductions are fairly treated according to established practice. So it came out that the net rateable value of the property is to be taken at £15,305, as stated. The valuation put forward by the Assessment Committee was based upon the insidious plan of reducing the tenant's allowances for capital, stock of coal, and every other necessary for carrying on a gas undertaking. This is a plausible and dangerous way of attacking a Gas Company upon their assessment, because it is so easy for Surveyors to swear, and for Counsel to argue, that any fancy figure that happens to suit them ought to be substituted for the customary proportion. If there is to be any finality about the valuation of gas-works, however, and any firm ground allotted for the hypothetical tenant to stand upon, there must be some constants from which his imaginary calculations can be legitimately started; and it is the peculiar value of this Croydon judgment that this principle has been re-affirmed in it.

School Boards and Gas Profits.

Some observations of the kind with which ratepayers everywhere are painfully familiar, were heard in London when the announcement was made that the precept of the London School Board for the ensuing half year would entail an increase of the rate by three-farthings in the pound, bringing up the total rate for the year to 11½d. The presentation of this estimate by the Chairman of the Finance Committee of the Board was the occasion of a lively debate, in which some members blamed the whole system administered by the Board for being practically worthless as well as costly; and one prominent Educationist—Mr. Macnamara—scouted the notion of there being any prospect for the Metropolitan ratepayer of relief from the burden of the schools, except he can find it in appropriated charity funds, the taxation of ground-rents, and "municipalized" gas-works, tramways, and so forth. Referring to this suggestion, *The Times* remarked that the history of the School Board building operations does not encourage the hope of "gigantic profits from the large "undertakings Mr. Macnamara has marked down as "spoil." Mr. Macnamara did not like the suggestion of the leader-writer in *The Times* that he was anxious to "mark down as spoil" the gas, water, and tram undertakings of London; and he wrote a letter to say that he was anxious "to treat all existing interests in the most "honourable manner." Of course, elementary honesty is not to be cast aside by an enthusiast for Board School teaching. At the same time, Mr. Macnamara confesses he is equally anxious "to see a future when the municipal "purse may be replenished from the profits accruing from "these particular undertakings;" and he makes out that "the profits from London gas concerns came out last year, "roughly, at the level of a 10d. rate." He asks why the gas and water profits should not, "say in twenty-five "years' time, be running our elementary schools in "London? If to cherish some sort of a more or less "despairful ideal in this direction is to be guilty of a desire "to 'mark down' certain things as 'spoil,'" Mr. Macnamara owns that he must, after all, be marked down a "spoiler." We have no sort of objection to anybody cherishing a "despairful ideal" of seeing gas profits applied to any purpose, after the legitimate appropriations of such moneys have been duly met and discharged. It is possible that in another quarter of a century the London gas and water profits may be equivalent to the charges of the London School Board; but the latter has no especial pretension to be liquidated by the former. Mr. Macnamara wants the gas and water profits for his own particular purposes. He may be paralleled by a professed sanitarian, who would spend the same money upon drains and sewage disposal; by an æsthetical individual, who would beautify London out of the same funds; by a would-be abolisher of poverty, who would apply all the money to solve the problem of "unemployment." And in the end there would be no gas or water profits left to quarrel over, and nothing more would be done for London, and the rates would be higher than ever. This is generally the way of reformers.

The Sandwich Corporation and the Gas Undertaking.—In the Journal last week, it was stated that the Sandwich Town Council had decided to purchase by agreement the undertaking of the Sandwich Gas Company. The terms will be settled by arbitration; Mr. E. Herbert Stevenson, M.Inst.C.E. (of Messrs. Stevenson and Burstal), acting for the Corporation, and Mr. H. E. Jones, M.Inst.C.E., for the Company.

WATER AND SANITARY AFFAIRS.

At their meeting to-day, the London County Council are expected to discuss the policy of the Moderate party on the question of the Metropolitan Water Supply; having in view the terms in which that policy is set forth in the report of the Parliamentary Committee, of which some account appeared in our columns last week. The report is of considerable length; but the recommendations at the close are sufficiently concise. First among these, we find the proposal that Her Majesty's Government be invited to constitute by Act of Parliament a public authority for the water area as defined in the report. It will be observed that the body to be created is at the outset a "water "Authority," and not a Water "Trust," though it might become such later on. But whatever shape it may assume, it is to be a distinct body from the County Council; and in this respect the recommendation directly traverses the lines of the Progressive party. The recommendation also departs from the spirit of the resolution by which the Committee were called upon to report the lines on which they would suggest that the Government should be asked to legislate. The divergence to which we refer consists in the non-observance of the condition set forth in the resolution, that the Council desired to be "the water authority for London." This desire was given as a reason why the Parliamentary Committee were to prepare a plan in place of that embodied in the Council's suspended Water Bills, which the Moderate party were said to have "wrecked." It may thus be held that the Committee have failed to observe the instructions under which they were called upon to prepare their report. Supposing the recommendation of the Committee to be adopted, it would place the Council in the peculiar position of calling upon the Government to set them aside in the disposal of the water question. Satisfactory as this would be in relation to the interests of the public, it is expecting too much to suppose that the County Council would exercise such self-abnegation. The Committee are bold, even too bold, to ask the Council to go to such a length.

In settling the constitution of the water authority, the Parliamentary Committee have regard to the extent of the jurisdiction. They mention that the County of London forms "only one-seventh of the area, the water require-"ments of which, according to the report of the Royal "Commission of 1893, have to be considered." They also suggest that the districts outside the Administrative County, now containing a population of a million and a quarter, may in forty years' time possess a population exceeding that of London. For this and other reasons, they consider it "essential for the complete settlement of the "question that a body should be created which shall "represent the interests and command the confidence of "the water consumers throughout the water area." This, in effect, takes the matter out of the hands of the Council. For the constitution of the water authority, the Committee are able to fall back, rather oddly, on a scheme sketched out by the Select Committee over which Sir William Harcourt presided in 1880. But while stating this for the information of the Council, they do not think it desirable at the present moment to indicate any specific lines on which the Government should be asked to proceed with regard to the composition of the proposed authority. Of course, it is expected that the County Council will be represented, as well as the Corporation, and with these the authorities of the outer area. The Local Government Board is also to have a place. The next question to be considered is, What is the water authority to do? First of all, it is to have vested in itself all the powers now lodged in other hands for the regulation of the Water Companies—including that for instituting inquiries into the quantity and quality of the water. These powers are to be exercised "pending purchase." The water authority is to have "full power to purchase the undertakings of all or any of "the Companies by agreement," failing which, parliamentary powers are to be sought, in order to provide for settling the business in some other way. There is also to be power "for dealing with the whole question, including "that of future supply."

Concerning purchase, we see particular objection to the proposal that the authority shall have power to acquire the undertakings of "all or any" of the Companies. In

fairness, it should be "all or none." We agree with the Committee where they say, in respect to purchase, that "no serious attempt has yet been made by the Council to "negotiate with the Companies." The attempts hitherto have been mere feints. The Committee urge that "friendly "negotiations" should at once be opened with the Companies for the transfer of their undertakings. This is to be done in order to avoid "a long and expensive contest "before Committees of Parliament" over the Bill of the Grand Junction, New River, and West Middlesex Companies. But our opinion of the County Council is such that we do not think it likely they will take the trouble to settle terms of purchase for property which they are not themselves to possess, but which is to be handed over in due time to the new authority. A curious proposal which finds expression in the report is, that it may be the duty of the Council to secure remote sources of supply in case they should be wanted, though this "need not involve any "obligation on the Council or the new authority to under-"take the expense of bringing the supply to London." To test the views of the Council on this point, it is asked that the Water Committee should be requested to report their final conclusions concerning new sources of supply "without delay." The Welsh scheme is not to act as a bogey, but is to be accepted or dismissed forthwith.

Reaching this point, and looking back over the whole report, we feel constrained to say that, while it is permeated by much that is sound and good, it is yet—and mainly for that reason—a most hopeless document to put before the London County Council; and its appearance there is absolutely incongruous. Its minimum demand is for more efficient control over the Companies. To this, the latter might consent; but it would never satisfy the Progressives. For a proper settlement of the water question, the great *desideratum* is a reasonable reform of the County Council. When this comes to pass, it will be found that little more is wanted. With regard to the report of the Parliamentary Committee, Mr. T. M'Kinnon Wood has given notice of an amendment, that Her Majesty's Government be asked whether they will promote or assist legislation dealing with the Metropolitan Water Supply on certain lines, including among other arrangements a severance between London and the outlying parts—the supply to London being placed under the entire control of the County Council in conjunction with the Corporation.

At the half-yearly meeting of the Southwark and Vauxhall Company on Tuesday last, the Chairman, Alderman Sir Henry E. Knight, referred in very decided terms to the expenditure forced upon the Company by the hostile policy of the London County Council. The shareholders had suffered from this cause to the extent of £10,000 in the past five years; and the outlay incurred during the present half year had been as much as £3000. The Chairman computed that, including the expenses devolving on the whole of the eight Companies, and those incurred by the Council, a total of about a quarter of a million sterling had gone utterly to the bad. For all this outlay there was nothing to show. This appeal to the facts of the case ought to have its proper weight with the press and with the public; but we fear that very little heed will be given to it, though Sir Henry Knight describes the attack by the Council as "a public scandal," and one which "ought "not to be permitted to go on." Some future historian—a kind of municipal Macaulay—may be expected to do justice to the situation. But for this we must wait. The immediate remedy rests with Parliament. Proceeding to the consideration of another point, we observe that the expenses arising out of the phenomenal frost in the early part of the year bear heavily on the Southwark Company; the outlay amounting to the weighty sum of £27,000. It was only by carrying £10,000 of this charge to the next half year that it became possible to pay a dividend of 6 per cent.; but the Chairman feared that on the next occasion the dividend would fall to 4 per cent. We share with Mr. Jeffreys in the hope that the increase in the Company's income, and the reduction of expenses will prevent the dividend from being so materially reduced. Even the Chairman expected a return to the higher rate. Some interesting facts were given with regard to the important works recently undertaken by the Company. The extensions authorized by the Act of 1894 will meet the demand up to the year 1900 or 1902. Parliament will now be asked to authorize a complete scheme, which will suffice until 1940. But more about this is to be learned at the Wharncliffe meeting to be held in due course. No doubt, the County Council will oppose the scheme, though it is designed to meet the requirements set forth in the report of the recent Royal Commission.

Mr. Frederick Tendron, presiding at the half-yearly meeting of the Grand Junction Company last Wednesday, drew a very marked distinction between the action of the County Council and the conduct of the official staff belonging to that body. In his argument, the Chairman was evidently influenced by a belief that the Council had undergone a partial "regeneration." But the fact remains that, including the aldermen, there is yet a majority on the Progressive side at Spring Gardens. The good influence of the Moderates is doubtless felt, backed as it is by the vote of the electorate. Hence, in part, arose the late decision not to proceed with the suspended Transfer Bills. But, at the next meeting, the Progressives defeated the recommendation of the Parliamentary Committee for placing the subject of the water supply in the hands of the Government, with the view of establishing "a" public authority to have charge of the supply in the Metropolis and the surrounding districts. A very similar proposal, but more thoroughly worked out in detail, comes before the Council to-day, though of its success we have the least possible hope. If the Council had a Moderate majority throughout, there would be some chance for such a recommendation; but the "altered nature" does not yet exist to that extent, though the balance, comprehending aldermen as well as councillors, has become a fine one. Mr. Tendron clearly has hope of the Council; and he throws the responsibilty of their hostile action towards the Companies on the officers, of whom he says he has "to complain most bitterly." Certainly there has been mischief somewhere; and "ambition" among the officials of the Council may in some degree account for it, though we rather lay the blame upon the Progressive members themselves. Concerning the Staines storage scheme, Mr. Tendron gave some striking figures, such as are at wide variance with Mr. Binnie's estimates, and which promise well for the success of the Bill which has been founded on that project. Mr. Tendron even hopes that the members of the County Council may have their eyes opened to see the extent to which they have been misled. This is complimentary to the Council, and is a very good way of broaching the question.

The Engineership of the West Ham Gas Company.—We understand that the duties of the engineership of the above-named Company have, since the death of Mr. John Thorman, been performed by Mr. John Clark, the Consulting Engineer to the Company, with the help of Mr. J. C. Wright, the Assistant-Engineer; the Directors having requested Mr. Clark to take the entire responsibility for the present.

Resignation of Mr. Ernest A. Loam.—The managership of the Stalybridge Gas-Works is about to become vacant by the resignation of Mr. E. A. Loam, who has held the position of Engineer and Manager for the past eight years. Mr. Loam has, we understand, been compelled to take this step solely owing to the worry and anxiety caused by the persistent and unnecessary interference of members of his Committee, which has lately become unbearable. Since Mr. Loam has been at Stalybridge, he has carried out considerable extensions of the works, including the erection of a 130-feet telescopic holder and tank, &c.

Management Changes.—Mr. William Ruxton, of the Arbroath Gas-Works, has been appointed Manager of the gas-works at Berwick-on-Tweed. There were upwards of seventy applicants for the situation. Mr. Ruxton's appointment will give general satisfaction; he being well known among the members of the North British Association of Gas Managers, whose annual meetings he regularly attended. His career is sketched by our Scotch Correspondent to-day.——Mr. Wynn, of Bollington, has been appointed Manager of the Milnthorpe Gas-Works, in succession to Mr. F. Hill, who has taken the management of the works of the Usk Gas Company, Limited.

Proposed Memorial of Mr. Denny Lane.—Those of our readers who perused the notice of the career of the late Mr. Denny Lane which appeared in the JOURNAL for the 3rd inst. will not be surprised to learn that a desire has been expressed in Cork, where he was regarded as a public benefactor, to perpetuate his memory by some permanent recognition of his services to science, art, and literature. The Mayor has accordingly convened a meeting of the citizens to consider the matter. The form which the memorial will take has not yet been decided; and it will, of course, depend upon the support accorded to the movement. As Mr. Denny Lane had a wide circle of friends and admirers among the readers of the JOURNAL, many will no doubt be disposed to assist in bringing the proposal to a definite issue. Those who are desirous of doing so will perhaps communicate with Mr. Thos. P. Travers, Gas-Works, Cork.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1258.)

THE condition of quietude which we noted in our last article as having come over the stock markets in general was continued all through the week just closed. Indeed, it was a good deal quieter; and it grew worse as the days went on. At first, prices were pretty steady; and some markets did fairly well—railways, for instance, being favoured by very good traffic returns. But gradually a decided state of flatness prevailed; buyers standing aloof, and giving no support. Consequently, prices for the most part went down; but not to so great an extent as might have been expected. Nor was the abatement universal; for here and there, owing to special causes, an advance was effected, and the Funds notably improved. The Money Market remains in just the same condition. The Gas Market did not share the general quietude, but was really pretty active, although not to the degree attained in the preceding week. The strength and buoyancy of the soundest and most choice undertakings were remarkable; and some quotations have made large advances in value, while several others have improved in more modest proportions. In Gaslights, the "A" stock was active, especially at the opening, and continued fairly busy through the week. Prices were steady; but they could not beat the best of the week before, until just at the close, when half a point better was scored. The secured issues were almost untouched—a solitary bargain in the "K" 6 per cent. preference being all the record. But it sent the quotation up nicely; and "C," "D," and "E" also rose. Dealings in South Metropolitans were numerous in the first half of the week; and prices were good generally, while the "A" stock marked a rise of 5. Commercials were lively again—both stocks scoring record prices; and the quotation of the new had a good rise. Among the Suburban and Provincial undertakings, the feature was the phenomenal progress of Brentford old, which rose every day, while the new also gained slightly. This, too, was done without a bargain being marked in either. Alliance old and Bromley new, however, had a slight recoil. The Continental Companies were unchanged, and exhibited no particular feature. In the remoter world, Chicago second mortgage was rather better, and Pará rather worse. There was a good deal more business marked in Water stocks; and the tendency was decidedly favourable. Chelsea and Southwark benefited by their improved dividends; and, among those whose dividends have fallen off, Grand Junction recovered a little from the resulting depression.

The daily operations were: The Gas Market was remarkably active on the opening day; the Metropolitan undertakings being well to the front. Prices were firm generally, and Brentford old rose 3; but Alliance old fell ½. Southwark Water gained 2. Transactions on Tuesday were less extensive; but prices remained firm. Brentford old went up 2; but Pará receded ½. Southwark Water rose 3. Business on Wednesday was about the same in quantity; but many more advances were made in quotations. South Metropolitan "A" improved 5; Commercial new, 2½; and Gaslight "C," "D," and "E," and Brentford old, 2 each; but Bromley new fell ½. On Thursday, there was renewed activity in Gaslight "A;" but the rest were quiet. Brentford old rose 1. In Water, Southwark advanced 2; and Grand Junction, 1½. Friday was a very quiet day; but both Brentfords rose 2; and Gaslight "K," 1½. Very little business was done on Saturday; but everything was firm. Brentfords and Commercials were "beyond price."

ELECTRIC LIGHTING MEMORANDA.

Report of Board of Trade Committee on Low-Pressure Supply—The Question of the 200-Volt Lamp—The Consumers' Interest in the New System.

As will be seen by the report on the subject in another column, the Committee of experts appointed by the Board of Trade to consider the desirability of altering the limit of low pressure, as defined by the regulations issued by the Department under the Electric Lighting Act, have lost no time in submitting their conclusions on the question to the President (Mr. Ritchie). The Committee (consisting of Lord Kelvin, Mr. W. H. Preece, and Major Cardew) had to deal first with the question of the sense in which the term "electric pressure" should be understood in connection with the alternating as well as with the continuous current; and they recommend the omission of the old definition which based it upon the production of heating effect in a thin, stretched wire or carbon filament. They further advise that where the conditions of supply are such that the pressure may at any time exceed 500 volts if continuous, or 250 volts if alternating, but cannot in any case exceed 3000 volts, the supply shall be deemed a high-pressure supply. This is as much as to say that anything up to 500 volts pressure in a continuous system, or its equivalent in an alternating system, should be regarded as a low-pressure supply; which is practically conceding the point raised in the interest of electric lighting undertakings at the recent conference. Certain subsidiary questions in regard to the matter are left in the hands of the Board of Trade, with a hint that further concessions to the demands of undertakers had better be granted tentatively. If the report is accepted by the Board, and the new regulations are drafted accordingly, the way will be cleared for the general introduction of the 200-volt lamp, which is what the supply companies are aiming at. A spoke is put in their wheel, however, by the requirement that the consent of the consumer shall be obtained before any alteration is made in the pressure of supply—consent of the consumer meaning, of course, that of fire insurance offices also.

The question of the 200-volt lamp was freely discussed by the *Electrical Review* in a recent issue; and it is deserving of a little examination, inasmuch as it certainly is one of the most prominent of the electricity supply problems of the day. On the face of it, the desirability of doubling the pressure in the supply mains seems hardly disputable, since it means a good deal more than merely enabling two lamps to be supplied where only one could be served before; thus repeating, with only a change of name, the hackneyed economist's claim to public gratitude. In many cases such a change would mean the salvation of a supply undertaking from impending bankruptcy; for it is notoriously hard to do a profitable trade with a 100-volt continuous supply save in a very few exceptionally good districts. On the other hand, our contemporary pertinently inquires: Why stop at the 200-volt lamp? Why not aspire to a 300-volt lamp with all that it entails? This sounds very enterprising, and full of promise of good times to come. But it is urged that, however desirable such a change may be, it will be wisdom to fall back upon the Cæsarean maxim and "hasten slowly." This caution is given for two reasons: First, because much of the wiring in existence is in a dangerous condition; secondly, because there will be for some time a difficulty in filling large orders for 200-volt lamps. Our contemporary ventures upon the assertion that "a good deal of inferior wiring would go clean out of existence if 200 volts were sent through it," with consequences that, for the good of electric lighting, it would be as well to avoid. There is, of course, a great deal of truth in this assertion; but it is difficult to believe that matters in this regard are really so bad as is asserted. At the same time, if there is any doubt respecting the carrying capacity of a system of house wiring, the new Board of Trade regulations will give the proprietor the benefit of it.

With regard to the much-talked-of 200-volt lamp, there is little reason to fear that, with a fair allowance of grace, the makers of lamps will be able to meet all possible demands upon them for these delicate articles. Up to the present time, such requirements for 200-volt lamps as have been tendered have been satisfied with an article in which the usual single filament is simply duplicated in series. You double the length of the filament in this way, and there you are! Unfortunately, as the *Electrical Review* reluctantly admits, this device can only be accepted as a temporary makeshift. If there are two filaments in the lamp in place of one, it means a double risk of collapse; and, besides, such lamps are more expensive to make. To obtain all the required resistance in a single filament, however, means a longer one than could be conveniently packed away in a bulb of the standard size, to which consumers have become accustomed, and to which their fittings are adapted. Thus it appears that the problem of the 200-volt lamp becomes more formidable the more attentively it is regarded. The thing that is clearest about it is that the new type of lamp must be either more delicate or clumsier than the old, and necessarily dearer. If this view of the matter should turn out to be permanently true, the consumer will have a good deal to say before he accepts a supply at 200 volts as an equivalent for the service he originally contracted for.

The proposed new regulations promise that before a 200-volt supply is imposed upon a consumer, his consent is to be sought and obtained. This in the first place means, as already remarked, making sure about the fire risks in this connection. So far as the consumer himself is concerned, however, his interest in the question lies in the cost of the lamps and renewals. What representation is to be made to him upon these points, and what is to be his remedy if he should be misled in this regard, and should, after experience of the new system, desire a return to the old? It seems to us that this is something for the partisans of the new system to settle before going any further with it. It is all very well for station managers to instigate a radical alteration in the conditions of the lighting service, on the plea that it will enable the same plant to serve double the number of lamps. But if a consumer discovers that it also entails his paying a higher price for lamps, and using up two for one, why should he be bound to go on taking a supply which lays him under this disadvantage? For, be it borne in mind, the consumer has nothing whatever to gain by being supplied with current at one voltage rather than at another. All he wants or cares for is the light he receives, and the price he pays for it; and to victimize him for the sake of the supply company is a proposal that it needs all the unequalled assurance of the electrician to make. We cannot fancy such a demand being preferred for the sake of the gas industry. Of course, the dearer lamp may be compensated for by a cheaper unit of supply. But there is no promise of this consideration for the present; so that, for the time being, the latest improvement of electric lighting technics would seem to imply not a cheaper, but a dearer lighting service.

THE VIRTUE OF TECHNICAL SOCIETIES.

It appears from his letter, published in last week's JOURNAL, that Mr. D. Irving, of Bristol, has been somewhat exercised in mind respecting the terms in which we have referred editorially to the suggested amalgamation of the South-West of England District Association of Gas Managers with the Southern District Association. He thinks we have permitted ourselves to indulge in some "strong criticisms of the South-West Association and those responsible for its management;" leaving it to be inferred from this observation that he could effectually dispose of these criticisms, if he would. As it is, however, our comments stand for what they may be worth; and we now desire to take the earliest opportunity for assuring Mr. Irving, and whoever may share his jealousy for the fair fame of the South-West Association and its recent management, that we have never been inspired, on this or any previous occasion, by any other feeling towards the members of the Association in question than that of extreme goodwill. The efforts of gas managers—scattered as the character of their employment requires them to be over the face of the land—to counteract some of the worst influences of this isolation, are deserving of the heartiest support and the warmest encouragement. We are not aware of having failed to render to the South-West Association, as a body, or to the individual members of it, all the help and recognition that a journal devoted to the same cause as that with which the organization is identified can be expected to afford. At the same time, there is nothing sacred about the nature or conduct of any particular District Gas Managers' Association, that we or anybody else should lie under an obligation to discuss it with bated breath. It can hardly be denied that the South-West Association has entered upon a period of decadence, and has been brought so low that—like St. Patrick's snakes—its leading spirits see no better fate before them than that of "committing suicide to save themselves from slaughter" in their official capacity. In what we have had to say respecting this condition of affairs in the South-West, we have chiefly sought to point a moral for the good of other technical societies of the kind to whom a similar fate may open unless they are warned in time. We endeavoured to place the facts of the situation of the South-West Association clearly before those whom such things concern; and if our diagnosis of the disease of the organization was faulty, it should be easy to correct it. Meanwhile, one might be disposed to condole with Mr. Irving and the others of his company, who, finding the times "out of joint," are fain to try and right them, but for the patent consideration that they are the best men available for discharging the painful duty they have undertaken.

We desire, however, to pass from the subject of the vicissitudes of the South-West of England Gas Managers' Association to the larger one of the proper work and the advantages of technical societies of the kind, and others. It is a commonplace to urge that the idea of the association, for the purpose of mutual assistance and instruction, of men of the same calling and tastes is a good one. Yet signs are not wanting that, so far at least as gas managers are concerned, the idea is losing something of its attractiveness. The fact of there being in England two national organizations for gas engineers where one would not merely suffice, but would be infinitely preferable, has doubtless something to do with the origination of that apathy to the claims of the smaller societies of which the case of the South-Western is the most striking, but not the only, example. Without adventuring further in this dangerous direction, it cannot be gainsaid that there are many gas managers who have ceased to interest themselves as they should do, and in numerous instances as they once did, in the proceedings of the District Association to which they still formally belong. This is not as it should be; yet it is not easy to suggest a remedy. It can be easily understood that when a small technical society, professing geographical limitations, is first started in a certain unoccupied and, so to speak, virgin district, if it succeeds at all its success is at first, and for some years afterwards, highly gratifying to its founders. The early Presidents and members of the Committee suggest themselves; and the rank and file of the profession dutifully attend the meetings and constitute the necessary "chorus." As time passes, a change comes over the proceedings. The prominent men of the locality get used up for office; and it seldom happens that the undistinguished chorus furnishes many examples of genius condemned to "blush unseen" whom the society has the good fortune to save from wasting sweetness upon the "desert air." More general is it for the transactions to serve as means of advertising the familiar figures of a handful of worthy persons who somehow become inevitable. Very remarkable it is how the "public form" which has shown itself in larger fields is confirmed by the experiences of these small societies. The prominent men are, as a rule, the best men; and there are not many of them. There is no reason in the nature of things why the small, undistinguished men—the hard-working, worthy souls who never write to the technical journals, never speak at a big meeting, have no speciality to urge them into what might be called public life, yet who do their duty manfully in the places appointed for them—should not do something to help to increase the interest of the unpretentious gatherings of their professional friends and neighbours; but they never do.

So the District Association Executive get, naturally enough, into the bad habit of looking to a few well-known members for help in the shape of papers and addresses; and the bulk of the membership does nothing at all besides assisting to pass votes of thanks, and so forth. It is even worse where the personality of the society is swelled by the inclusion of the much-discussed order of associates—"trading" or otherwise. It is not necessary to revive the more familiar of the strictures that have been passed upon this order of society members. We have always been willing to concede the force of the theoretic claim for those who are connected with the gas industry in capacities other than those of works' management and engineering to a share in the benefits of association; but it must be admitted that, with rare, though noteworthy, exceptions, the men of this order do little in return for the privilege, except such things as were better left undone. This may be a hard saying; but it is a true one, and needs to be said. There are in the kingdom technical societies for followers of the gas industry which include "associates," and there are others from which all but gas managers and engineers strictly so termed are rigorously excluded. Which are the most successful, enjoyable, and fruitful of good teaching and criticism?

The ordinary, silent member of a technical society may be, and often is, a great stickler for its credit and reputation for usefulness. At times, he gets upon the Committee, and may then go about saying the most truculent things respecting the "irresponsible critics" who venture to find fault with some points of the policy of the administration. Even if it may be found expedient to alter the policy upon the lines of the criticism, no public admission of the fact is permitted to go upon the record. Such things have been, and will be; but it should be understood that devotion of this kind cannot save a technical society from perishing of constitutional weakness. Whether the society is a small local one or aspires to national importance, it can only be saved by all the members doing their duty by it in their degree—the prominent ones not flagging after they have made out of it such advantage as the highest office can bring; the less distinguished not resting content with the state of insignificance to which but for others the whole organization would be brought through them.

Not long since, a contemporay, *Engineering*, published an article upon the work of Technical Societies, which was well worth reading. Contrasting the state of knowledge during the ages when "the exponents of the arts delighted to speak of their callings as 'mysteries'" with that of the present time, the article sought to establish the conclusion that the chief cause of the difference is the modern practice of spreading information, to which nothing contributes more than the technical society and the technical press. The observation is made that the new order—the change from ancient and mediæval obscurantism to modern openness—was not really due, as is often said, to the invention of printing. We fully agree with this view; because books were cheap enough for most practical purposes in ancient Rome, and farther back still the Greek philosophers managed to get their ideas into all the circulation it was possible for them to attain by the very simple method of talking about them. Printing, when it came, was merely the new agent for the conveyance of the renascent spirit of the free disclosure of knowledge; and neither the modern journal not the modern society could exist if the willingness to share information were not pre-existent. Humanity is slow to learn; but among the lessons which it has conquered is that knowledge increases by spending. Those who refrain from mingling with their compeers are apt to lie under the suspicion of being tainted with faults of temperament to which they may in reality be strangers; but the surest way to escape from such disadvantages is to come out of one's shell, and live at least a part of one's life in the open. The decay of Gas Managers' Associations would be regrettable on many accounts, and not the least that it would inevitably tend to a repetition in the annals of the industry of that phase of occultism through which it had to pass when one gas manager knew not his nearest neighbour save as a possible rival for the scanty rewards of an imperfectly understood and inefficiently practised manufacture upon which the light of free criticism had never been allowed to shine. As it is, the gas engineer who wilfully withdraws from association with his compeers may have his excuse; but it is certain that he loses more than he can possibly gain from his aloofness.

Important Issues of Additional Metropolitan Gas Stock.—Readers of our advertisement columns will doubtless have noticed the somewhat unusual announcement of the issue of additional stock by the two principal Metropolitan Gas Companies. The Gaslight and Coke Company invite tenders for £100,000 of their ordinary "A" consolidated stock, the minimum price for which has been fixed at £292 per cent. As this stock brings the investor, according to our share-list to-day, £4 5s. 6d. per cent. for his money, applications for it are not likely to flag. Noon on Thursday next is the latest time for sending in tenders. The South Metropolitan Gas Company are about to sell by tender £20,000 of 5 per cent. perpetual debenture stock, the minimum price for which is fixed at £172 10s. per cent. This stock is yielding the investor £2 16s. 2d. per cent. The 1st prox. is the limit of time for sending in tenders.

COMMUNICATED ARTICLE.

NOTES ON CURRENT TOPICS.

By "Veritas."

It is a very open question, with regard to the illuminating power of gas, what particular quality would most pay the consumer and the producer. In making this comment, the question of illuminating power is solely referred to, and not the possible increase or decrease in the proportion of those compounds which are at present regarded as impurities. Parliamentary legislation with respect to the latter is perhaps not altogether sensible from all points of view. The limitation of "sulphur compounds other than sulphuretted hydrogen," to a fixed limit such as an ordinary gas company can conform to, is useful and reasonable in the public interest, inasmuch as there is no dispute that the products of combustion from these particular compounds are more or less injurious to health, and are also open to the suspicion of having a prejudicial action on wall-papers, picture-frames, and the binding of books.

With reference to the limitation of the amount of ammonia permissible in the gas supplied to the public, this particular substance can hardly be regarded, in an ordinary sense, as an impurity. The only injurious effect on the consumer from an excess of ammonia in the gas supplied is the well-known corrosive action which it exercises on brass fittings. I am not aware that this form of so-called impurity in any way affects the products of combustion. At the same time, considering the commercial value of ammonia as a bye-product of the manufacture of gas, it is obviously to all gas companies' interests to remove as much as possible of this special substance on the works, and allow the minimum amount of it to go on to the district. Not only is this true, but the removal of ammonia from the gas in the process of manufacture is so simple, and the means for effecting it are so well known, that there is really no excuse, under ordinary circumstances, for any company to exceed the official limits.

As to sulphuretted hydrogen, the case is totally different. No trace of this form of impurity is, under prescribed conditions, allowable; and the delicacy of the test is so great that the most minute fraction of a grain, estimated by almost a vanishing decimal, is discoverable. There is no doubt that *free* sulphuretted hydrogen would be an objectionable compound in the atmosphere of rooms. It is probably normally present during an ordinary London fog, if the testimony of blackened silver plate is any evidence which a scientific chemist would certainly take as good and substantial proof. With regard to the presence of an infinitesimal quantity of sulphuretted hydrogen in the gas supply, the ordinary fittings are supposed to be sound; and if they are not in this condition, they are a source of distinct danger. If unsound, and presuming the gas supply to contain an amount of sulphuretted hydrogen far exceeding the parliamentary allowance, danger-point would be reached on the pure question of an escape of gas long before any injury would be incurred from the presence of sulphuretted hydrogen. Assuming that the usual gas-fittings are practically sound, which is normally the case, we have simply to deal with the possibility of a minute proportion of sulphuretted hydrogen affecting the products of combustion. From this point of view, an amount of sulphuretted hydrogen which might render a gas company liable to a penalty of £50 a day would not have an appreciably prejudicial effect on the consumer, as it would simply add a fraction of a grain of sulphur to that already allowed in the form of other compounds.

The question of the parliamentary regulation being so rigid with respect to the presence of the faintest trace of sulphuretted hydrogen in the gas supplied to the public, regarded from an ordinary common-sense point of view, must thus seem absolutely ridiculous. The only redeeming feature of this rigid and extreme regulation is that the removal of sulphuretted hydrogen can be easily and efficiently accomplished by well-known means, and without the exercise of extreme scientific skill.

In dealing with the parliamentary regulations of public gas supply, the question of illuminating power is a distinctly debatable one. In some districts, 20-candle gas is supplied; in others, gas of only 16-candle value; while in the case of some provincial gas companies, the Special Acts under which they are working only require a standard of 14 candles. The fact of some districts being satisfied with the lower-grade gas has been made a pretext, by authorities whose high position in the gas world should carry considerable weight, that the supply of gas of high candle power is unnecessary, and that a comparatively low illuminating value would be sufficient for all public requirements. The argument has, indeed, been carried so far that it has been seriously discussed whether it would not be advisable to reduce to a lower limit the 16-candle standard of gas supplied to London. The only claim for this being done would be that, if the natural gas ordinarily produced from the coal could be supplied to the consumer, the expense of enrichment would be avoided, and that the cost of the gas would be proportionately reduced.

This question of low-grade gas demands serious consideration, and involves much complication. An ordinary consumer who uses most of his gas for illuminating purposes would have to employ a larger proportion to produce a definite light, if the quality of the gas, *quoad* lighting power, were deteriorated. He would thus, while obtaining gas at a cheaper rate per 1000 cubic feet, naturally use more of the material to obtain the same quantity of light that he had been previously accustomed to. With regard, however, to the application of gas to the purposes of heating and motive power, for which it is coming into increased demand, it is questionable whether the value of the gas to the consumer from this point of view would be proportionately deteriorated by a small diminution in lighting value. So long as a particular company have to supply gas to the public of an illuminating power higher than that normally produced by the coal employed in its manufacture, some light-giving adjunct must necessarily be resorted to. Whether cannel coal is employed for this purpose, or whether the more modern practice of carburetting by other materials, is adopted, the result in all cases must be an increase in the cost of manufacture; the expenditure for enrichment depending on the material used and its efficiency.

Putting on one side, for the present, the possible advantage of substituting carburetted water gas for normal coal gas, the necessity for enriching the latter, under existing regulations, must be recognized. Of materials available for this purpose, there are, in the first place, various grades of petroleum spirit, the limit of which is possibly reached with a specific gravity not much exceeding 700. The use of benzol has been strongly advocated; but the disadvantage of this special material is the extreme fluctuations in its market value, and therefore of its consequent cost as an enriching material. We have in addition the fact already previously known to competent authorities, but recently prominently alluded to in the letter to the JOURNAL by Mr. E. Llewellyn Pryce (*ante*, p. 1090), that commercial benzol contains sulphur compounds, and that gas companies working under sulphur restrictions might find this a serious drawback in the employment of this special material. There is no doubt, according to all the published statistics, the value of benzol as an enricher is far superior to any other material in the market; but the question of its employment in preference to lighter grades of petroleum spirit which are more readily available, and of which the supply is far more plentiful, must be a question of price in proportion to efficiency. The use of petroleum spirit has at least this one merit, that there has been in no case any suspicion of its containing sulphur compounds in any form.

In the modern system of enrichment by carburetting, dependent upon the vaporization of volatile fluids into the clean gas there are many points for consideration which have not as yet been thoroughly investigated. Initially, the ordinary manager might consider the problem practically solved in forming a judgment with regard to two different classes of material, if he were informed of the three special details of cost, volatility, and power of enrichment. One detail, however, is missing, and that is what is commonly termed "carrying power." Certain grades of hydrocarbons will seem to blend perfectly with the gas, and afford an apparently satisfactory result on the works; but the question of absolute permanency when the gas has to travel a long distance, is still more or less an unsolved problem.

Accident to a Water Intake.—A few weeks ago, the submerged steel intake of the water-works of Toronto (Ont.) made its appearance on the surface of the bay at two points. The upper portion of one of the flanged joints of the floating pipe opened about 2 feet, necessitating breaking the balance of the joint before the pipe could be lowered. In the winter of 1892, a somewhat similar accident occurred at Toronto, the pipe breaking through the ice.

Issue of Additional Debenture Stock of the East London Water Company.—In response to the invitation recently contained in our advertisement columns, there was keen competition for the £125,000 of 3 per cent. debenture stock which the Directors of the East London Water Company a short time ago decided to issue; the minimum price being par. The highest accepted tender was at £6 10s. 6d. per cent. premium; the lowest, at £4 11s. per cent. The average being £4 16s. 6d. As a proof that the investing public have not lost confidence in the Company's stock, it may be mentioned that the amount was tendered for five times over.

A Useful Pamphlet for Gas Consumers.—We have received from the Secretary of the Sheppy Gas Company (Mr. A. W. Marks) a copy of the new edition of the useful little pamphlet issued by them under the title of "A Few Words about Gas Lighting in Dwelling-Houses." The remark has at times been made to us that some gas managers are not sufficiently on the alert to "push" their commodity. This cannot be said of Mr. Marks. In the space of a dozen small pages, he sets forth the advantages and cost of gas as compared with the dangers of oil, deals with the question of fittings and their hire or purchase, explains how to read a meter, and furnishes estimates for fitting up houses. Here, in a nutshell, is all that a possible consumer wishes to know. But the author also slips into his pamphlet a leaflet in which he offers a few useful remarks on the prepayment system and the economy of coke as fuel. Mr. Marks will be pleased to send a copy of his pamphlet to any manager on receipt of a penny stamp to cover postage. The Company's offices are at Sheerness-on-Sea.

TECHNICAL RECORD.

NITROGEN AND THE NITROGEN PRODUCTS DERIVED FROM COAL.

The following is an abstract-translation of the paper read by Dr. Knublauch at this year's meeting of the German Association of Gas and Water Engineers at Cologne. The full text of the paper is given in the *Journal für Gasbeleuchtung* for Nov. 30 and Dec. 7.

The behaviour of the carbon and hydrogen of coal on distillation is the chief point of interest in gas or coke manufacture. At the coke ovens, the aim is to obtain the greatest quantity of carbon as solid residue; in the gas-works, it is to hold as much carbon as possible in combination with hydrogen—and especially in those combinations which form the best illuminating hydrocarbons. The choice of coal and the conditions of production—more particularly the temperature of distillation—are the most important factors in producing the best illuminating gas. It has been shown that benzol and a small quantity of toluol are chiefly responsible for the illuminating power of gas; but exposure to a somewhat higher temperature will partially destroy them, with formation of graphitic carbon and so-called diluents. But besides the constituents of coal which on its distillation yield gases suitable for producing light and heat, there are certain other constituents, occurring in inconsiderable quantities, which claim attention. These are sulphur and nitrogen, of which the latter is the more important, since certain of its products have a very high market value. The nitrogenous products of distillation were regarded for some time as very troublesome, and even to-day in gas-works are often considered of secondary importance, though costly ammonia-recovery apparatus is attached to coke-ovens. The importance of the nitrogen products from coal will be sufficient justification for the publication of the following results of experiments and observations, made during a number of years at the Cologne Gas-Works, and subsequently in the author's laboratory.

The amount of nitrogen is very variable in different sorts of coal, and even in the same kind. There is from 1·3 to 1·6 per cent. in Westphalian coal. The proportion that is converted to valuable compounds is, however, very small; forming only from 0·2 to 0·25 of the weight of Westphalian coal. The enormous amount of coal distilled daily in gas-works and coke-ovens, makes the total quantity of these easily obtained compounds very large indeed. The daily demand of a million tons of coal over the whole globe, corresponds to a yield of ammonium sulphate of about 10,000 tons daily, taking the nitrogen recovered as ammonia at 0·2 per cent. of the coal. The coal used at Cologne puts yearly into the gas-retorts alone about 1000 tons of nitrogen, of which 200 tons is recovered as ammonia and cyanogen; and these, reckoned as sulphate, may be valued at £12,500. It may appear remarkable that ten years ago we knew nothing of the remainder of the nitrogen; and only quite recently the matter of its disposition has been solved, in the course of a determination of the proportion which is converted to cyanogen.

We have seen that no certain relation exists between the nitrogen content of coal and the yield of nitrogen products; but until recently it was deemed correct to calculate the one from the other. This ignorance had two causes. On the one hand, too little value was attached to chemistry in the gas industry (and this remains the case); and, also, until the nitrogen question was better understood, probably there was no gas-works at which the products could be so separated as to enable any molecule of the coal distilled to be traced in any form in the products obtained. When this had been effected very well in Cologne, after the chemical bearings of the subject had been properly worked out, the nitrogen question again came to the front. The defects in wet purification and in the liquor works having been disposed of by chemical guidance, experiments showed that the ammonia completely extracted from the gas in the gas liquor yielded only 9·6 to 10 parts of sulphate per 1000 parts of coal—corresponding to a percentage of nitrogen in the coal of nearly 0·2 only. Estimations of the nitrogen in the coal carried out at the same time, showed seven to eight times that quantity—corresponding to 70 to 80 parts of sulphate per 1000 parts of coal. Attempts to convert more nitrogen into ammonia were so far successful; but, on the other hand, disadvantages accrued, and the new processes were put on one side. The most memorable were the addition of lime to the coal before distillation, and the passage of steam over the incandescent coal and coke.

What becomes of the 86 to 88 per cent. of the nitrogen of the coal unaccounted for hitherto? A very small quantity occurs as cyanogen in the gas and as nitrogen bases in the tar; and there are only the coke and the gas where the residue may possibly be found. Actually, analyses showed a great quantity of nitrogen in the coke. The nitrogen content of the coke may even be higher than that of the coal, especially when the volatile nitrogen is small in relation to the total volatile matter of the coal. Nitrogen is not, like sulphur, detrimental to the use of the coke; and estimations of it were not therefore carried out for the valuation of the coke. Without entering closely into the question, we gain the impression that, with a higher temperature in the retorts, the nitrogen will not remain in the coke. After estimating in addition the nitrogen in the tar and the nitrogen as cyanogen in the gas, no other nitrogen compounds are in the products; and the surplus nitrogen must be free in the gas.

Exact results are scarcely obtainable in large-scale working, or only after long-continued trials; and therefore a laboratory apparatus was devised for distilling the coal. By this, it was found that the generally possible yield of ammonia could be determined for various coals, and variations made dependent only on the choice of the coal. The results of experiments proved: (1) That the nitrogen content of the coal and its distribution among the different products are not in any degree proportional. For example, the yield of ammonia may be much greater from a coal of low than from one of high nitrogen content. This statement is also true of the other nitrogen products. Thus, a sample of coal containing 1·176 per cent. of nitrogen yielded 0·1874 as ammonia; one containing 1·555 per cent., yielded 0·1850; and one containing 1·479 per cent., yielded 0·2086. (2) These variations are frequently very great with coal of different origin, and often small with the same kind, though even then they are sometimes very considerable.

Foster has investigated the question as far as English coals are concerned; and Schilling has made some experiments with various kinds. The yield of ammonia found is confirmed in the three series of observations. The yield for different kinds of coal in coke-ovens working on the large scale has been also determined; and a series of coal distillations has been made in which the ammonia has been completely extracted from the gas and liquor. Though more recently introduced at the coke-ovens, ammonia-recovery is often better carried out there than in many gas-works. A large number of distillations of many kinds of coal have been made by the author to ascertain the yield in the various products. The average yield of sulphate of ammonia for coal from fifteen different sources is shown in the following table:—

Experiments on the Distillation of Coal.

Source of Coal.	Number of Tests Made.	Average Yield of Sulphate per 1000 Parts of Coal.
Westphalia (*a*) gas coal	6	10·4 parts.
,, (*b*) cannel (so-called)	3	7·7 ,,
,, (*c*) coke-oven coal	9	11·0 ,,
Upper Silesia (*a*) gas coal	1	13·5 ,,
,, ,, (*b*) coke-oven coal	8	
Lower Silesia (*a*) cas coal	2	7·7 ,,
,, ,, (*b*) coke-oven coal	3	8·4 ,,
Saar	6	8·2 ,,
England, gas coal	3	16·4 ,,
Belgium	1	6·8 ,,
Moravia, coke-oven coal	3	10·6 ,,
Russia	1	11·8 ,,
North America	10	9·4 ,,
South America	1	13·3 ,,
Italy, lignite-like coal	2	28·9 ,,
Bohemia	2	7·4 ,,
Scotland, cannel	2	7·9 ,,
Spain	1	2·3 ,,
Australia	2	1·9 ,,

In choosing coal for gas making, it is desirable to ascertain the yield of tar, ammonia, and sulphuretted hydrogen, as well as that of coke and gas. The difference in yield of ammonia varies in importance according to the current prices of ammonia compounds. The difference between 8 and 12 parts per 1000 parts of coal, would mean, to a works like Cologne, the difference between 700 and 1050 tons of sulphate per year—that is to say, about £4000 value. It is also of considerable importance to know the yield of sulphuretted hydrogen from a coal, especially in cases where the purifiers have occasionally to be worked to their utmost capacity. This yield also is in no degree proportional to the amount of sulphur in the coal. It is easy to choose coal which shall not throw a great burden on the purifying plant.

Returning to the nitrogen, a close examination of the amounts converted to ammonia reveals here and there considerable discrepancies, even with coal of the same origin. Thus, two tests of Westphalian coal give 12·6 and 9·6 of sulphate respectively; two of Upper Silesian coal, give 16·7 and 11·5 respectively. The above table reveals also very large differences in yield of ammonia in coals of different sources; English coal having the very high yield of 16·4 parts of sulphate per 1000 parts of coal. The differences in the yield of coals from the same source, one suited for gas making and the other for the coke-ovens, are also striking; and as regards Westphalian coal, the differences are exemplified in the results of the working at the gas-works and at the coke-ovens. This may be explained, since with the coals which produce more (or richer) gas and more tar, the affinity of hydrogen for carbon is favoured at the expense of its tendency to combine with nitrogen.

Reverting to the distribution of the nitrogen among the different products, we will, for the sake of simplicity, compare three samples of coal. The results are given in the next table. The ammoniacal nitrogen here ranges from 11·9 to 15·9 per cent. of the total nitrogen. The Saar coal, with the lowest content of nitrogen, gives the highest proportion of nitrogen as ammonia. The differences in the nitrogen in the coke and gas are especially striking. With Westphalian coal, about one-third of the nitrogen remains in the coke, and one-half passes into the gas; with Saar coal, two-thirds is in the coke, and one-sixth passes into the gas.

	Percentage of Nitrogen on the Coal.			Percentage of Nitrogen on Total Nitrogen.		
	Westphalian Coal.		Saar Coal.	Westphalian Coal.		Saar Coal.
	(1)	(2)		(1)	(2)	
Coke	0·4660	0·5260	0·7510	30·0	35·6	63·9
Gas	0·8560	0·6964	0·1896	55·0	47·1	16·1
Ammonia . . .	0·1850	0·2086	0·1874	11·9	14·1	15·9
Cyanogen . . .	0·0268	0·0268	0·0480	1·8	1·8	4·1
Tar	0·0212	0·0212		1·3	1·4	
Coal . . .	1·5550	1·4790	1·1760	100·0	100·0	100·0

The import of this is seen in the effect on the percentage of nitrogen in the gas. On converting the weights of nitrogen yielded to the gas into volumes, and taking an average make of gas from the coal, it will be found that the gas from the coal contains a percentage of 2·4 and 2·0 with the Westphalian samples, and only 0·54 with the Saar coal of nitrogen derived from the coal itself. The behaviour of the nitrogen is much more favourable to the gas with Saar coal, as the volume of this constituent, which so diminishes the illuminating power of the gas derived from it, is only one-quarter to one-fifth of the volume derived from the Westphalian coals.

The ammonia formed in the distillation of the coal must be completely secured in a marketable form. It will suffice, in this connection, to point out here that it is often easy to abstract the whole of the ammonia even with apparently inadequate plant. Recent observations have convinced the author that in many cases where only two-thirds to three-quarters of the ammonia was abstracted, a change in the working based on experiments resulted in the whole being secured, and without extension of either condensing or washing plant. No gas-works should be content with much less than the yield of ammonia indicated in the table given above for particular kinds of coal—for instance, 10 or rather more parts of sulphate per 1000 parts of Westphalian coal. Supposing a works of the size of Cologne only put two-thirds of the ammonia produced in the retorts on the market, the deficit due to the loss of ammonia would amount to about £3000 net profit, while many indirect disadvantages would be incurred. About 0·2 to 0·6 part of sulphate per 1000 parts of coal can generally be obtained from the water in the tar, and this is not usually recovered at the gas-works.

(To be continued.)

Consolidation of Gas Plants in New Jersey.—We learn from the *Engineering Record* that Messrs. Emerson M'Millin and Co., of New York City, representing a Syndicate headed by them, have purchased the gas and electric lighting plants of Long Branch, Red Bank, and Asbury Park (N.J.); and franchises covering the entire ocean front from Seabright to Sea Girt, about 20 miles, except Ocean Grove. The Consolidated Gas Company of New Jersey has been formed to develop and operate the properties. It is said the works will be enlarged so as to produce about 250 million cubic feet of gas per annum.

Received.—"Gas Manufacture: The Chemistry of. A Practical Handbook on the Production, Purification, and Testing of Illuminating Gas, and the Assay of the Bye-Products of Gas Manufacture. For the Use of Students, Chemists, and Gas Engineers." By W. J. A. Butterfield, M.A., F.C.S., Head Chemist at the Beckton Gas-Works. With numerous illustrations. (London: Charles Griffin and Co., Limited, Exeter Street, Strand.)——We have received from Mr. R. S. Carlow, of Arbroath, the Secretary of the North British Association of Gas Managers, the report of the proceedings at the meeting of the Association held in Melrose in July last. Appended thereto is the statistical report of the gas supply in Scotland, dealing with the period from July 31, 1894, to Aug. 1, 1895, prepared by the Committee of the Association.

Personal.—The Directors of the Tonbridge Water Company have presented their Chairman, Mr. John Fagg, with his portrait, enclosed in a handsome gilt frame, in recognition of his twenty-one years' connection with the directorate. Mr. Fagg has been Chairman of the Board for the past ten years. The presentation was made by Mr. Hodgskin, who expressed, on behalf of his colleagues, the hope that Mr. Fagg might continue for many years at the head of the Company, and see it go on as prosperously as it was doing now. Mr. Fagg, in acknowledging the gift, said he trusted he might be spared for some time to give his attention to the Company's affairs, and to witness its continued prosperity. The Company's Engineer and Secretary (Mr. J. Lees) then gave a brief sketch of the progress of the undertaking during Mr. Fagg's chairmanship; and the Chairman acknowledged the Directors' indebtedness to Mr. Lees for a great deal of excellent practical advice. Prior to the presentation, the Directors visited the pumping-station, and expressed their great satisfaction with the changes Mr. Lees had brought about there.——Messrs. Stevenson and Burstal, MM.Inst.C.E., have been engaged by the Faversham District Council to carry out their new water-works at Boughton-under-Blean, which, as mentioned in the JOURNAL last week, have just been sanctioned by the Local Government Board.

SOCIETY OF ENGINEERS.

The Forty-second Annual General Meeting of this Society was held on Monday last week, at their rooms, No. 17, Victoria Street, S.W.—Mr. W. G. Peirce (the President) in the chair. The following gentlemen were duly elected by ballot as the Council and officers for 1896: As President, Mr. S. H. Cox; as Vice-Presidents, Messrs. C. C. Carpenter, G. Maxwell Lawford, and W. Worby Beaumont; as Ordinary Members of Council, Messrs. J. Bernays, G. Burt, J. C. Fell, C. Gandon, P. Griffith, C. Mason, H. O'Connor, and S. Sellon; as Honorary Secretary and Treasurer, Mr. Perry Fairfax Nursey; as Honorary Auditors, Messrs. Alfred Lass, F.C.A., and Samuel Wood, F.C.A. The proceedings terminated with a vote of thanks to the President, Council, and officers for 1895, which was acknowledged by the President.

The Annual Dinner of the Society took place at the Holborn Restaurant on Wednesday—Mr. W. G. Peirce presiding. After the usual loyal and patriotic toasts had been duly honoured, Mr. J. W. Wilson proposed "The Society of Engineers," and congratulated the Society on the useful functions it continues to discharge. The President, in responding, said the papers read at the ordinary meetings had been on most interesting subjects, had been carefully prepared, and had evoked good discussions. He dwelt upon the value of belonging to scientific societies, and said that much valuable experience could be gained by joining those where opportunities were freely given to the members—both old and young—to take part in the discussions on the papers submitted. The summer vacation visits to engineering works had been of great interest. They had been well attended, and had proved most beneficial to all who availed themselves of the invitation to join in them. Lastly, the President advised all the younger members of the profession to take advantage of the opportunities offered by the Society both at ordinary meetings and at the vacation visits; for though the modern technical educational establishments did a great deal, there was much to be learnt in actual workshop experience and by visits to works in progress. Mr. Perry F. Nursey and the Secretary (Mr. G. A. Pryce Cuxson) also replied; the latter stating that in the last ten years the membership of the Society had increased by 30 per cent. Other toasts followed. During the evening, a good selection of vocal music was given under the able direction of Mr. J. A. Brown.

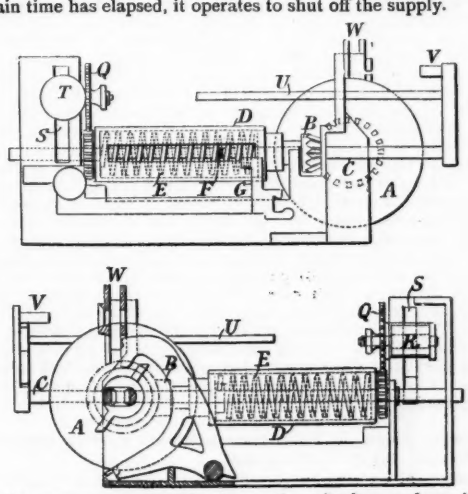
REGISTER OF PATENTS.

Convertible Lighting and Cooking Burner.—Maule, C., of Handsworth, Birmingham. No. 21,216; Nov. 5, 1894.

This arrangement consists of a small metal funnel, inverted over a gas-burner; the spout of the funnel being either cylindrical or sloping outwards to the top. The base of the funnel-cone is closed by a shutter (for admitting or excluding air) composed of two parts—the one moveable, and the other fixed. The fixed part crosses the middle of the base of the funnel, and has fixed in its centre a cylindrical socket—extending vertically inwards—of such height and diameter as to fit the burner, yet so as to move on and off easily. The moveable part is a slide revolving round this socket, and of such shape as when closed to entirely exclude air from the funnel, but when open to exactly coincide with the fixed part.

Coin-Freed Gas or Liquid Supply Apparatus.—Alexander, W., and Thompson, W. E., of Birkenhead. No. 22,217; Nov. 17, 1894.

In this arrangement of coin-freed meter, the patentees propose to employ preferably an escapement wheel rotated through a certain angle on the insertion of each coin, by means of any suitable coin-feeding device—such as that described in their former patent No. 20,475 of 1894. In this way, by means of gearing to be hereafter described, a cock, valve, switch, or the like is operated so as to release the supply mechanism; and also by the action of the meter after a certain quantity of gas has been supplied, or by the action of a time-keeping device after a certain time has elapsed, it operates to shut off the supply.



A is the escapement wheel, having teeth on its face, and gearing with

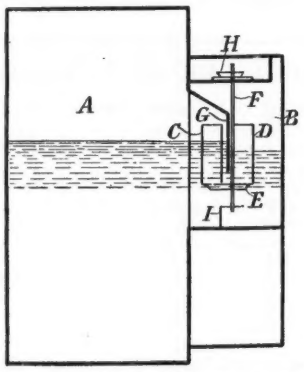
a bevel-wheel B, mounted loosely on the spindle C. D is a tube or cylinder, also mounted loosely on the spindle C, and carrying a toothed wheel, which gears with the ordinary index of the meter. E is a helix or spiral, fixed to the bevel-wheel B, and operated thereby on the insertion of a coin. F is a stop, mounted on the spindle C, so as to be free to rotate, but having no longitudinal movement thereon. It passes through a slot in the cylinder D. Thus, if the escapement wheel be rotated by the insertion of a coin, it will cause (by means of the bevel gearing) the helix or spiral E to rotate also; and the stop F, which engages in the coils of the helix, will be moved away from the catch G, which operates a valve or cock, so as to liberate the supply mechanism. The stop F is prevented from rotating during this movement by engaging a slot F^1 in the cylinder D, which latter (as before stated) is geared to the meter mechanism. When the projection F has travelled a distance proportional to the number of coins inserted, the cylinder is then rotated by the meter mechanism in a direction similar to that in which the helix was rotated, thereby causing the projection to travel along a spiral path back again to its original position, and shut off the supply. As the stop leaves the catch on the movement of the coin mechanism, a projection comes in contact with an arm of the catch, and forces the latter down so as to open the valve.

If a change of price takes place, adjustment of the mechanism is effected by changing a wheel in the gearing between the scape-wheel and the meter or time-keeping device and the stop mechanism. In the engraving, such a wheel Q is shown, carried in a moveable bearing R, which moves in a slot S, and is secured in any desired position by a set-screw T.

The effect of inserting a number of coins successively is to cause the stop F to be removed farther from its normal or shut-off position, and to require a correspondingly prolonged action of the meter or time-keeping device to move it back again; and so a greater or less quantity of gas will be delivered in proportion to the number of coins inserted. A pointer moving on a dial (not shown) may be attached to the arm U, which works in harmony with the stop F on the spindle C, and indicates the amount of gas still unconsumed. Moving with the arm U and spindle C is a bolt V, which, when a predetermined number of coins have been inserted, enters the coin-slot W, and prevents the insertion of any more coins until (under the action of the meter) the bolt is withdrawn.

Gas and Liquid Meters.—Alexander, W., and Thompson, W. E., of Birkenhead. No. 22,217A; Nov. 17, 1894.

This invention relates to wet gas-meters, and consists in an improved arrangement of float and parts appertaining thereto for actuating the valve which cuts off the supply when the water-line is lowered to a given extent.



A is the measuring chamber of the meter; and B, the chamber into which the gas enters. C D are two portions of a float—in this instance rigidly attached by a link-piece E. The link-piece can, however, be connected by hinges to the floats, and the floats be guided vertically in any required manner. F is the valve-spindle; and G, a diaphragm dipping below the surface of the water, and serving to separate the entering gas in the chamber B from that in the measuring chamber A. H is a valve on the spindle F; and I, a guide for the spindle below the level of the water. The spindle F is attached rigidly to a portion of the float, or else jointed to the connecting link, if the latter be hinged to the two portions of the float. In the latter case, the two portions of the float, or the length of the connecting link and the position of attachment to the valve-spindle in the connecting link, are so proportioned that, no matter how the gas pressure fluctuates and the water on one side of the diaphragm is lowered and that on the other side raised, the point of attachment of the spindle to the link shall remain at approximately one uniform height, with a given quantity of water in the meter, although the heights of the two portions of the float may vary widely according to the pressure of the gas. The centre of specific gravity of the entire float, however, remains approximately at rest. By this means, when a difference of pressure occurs, the water on one side of the diaphragm falls; and with it falls also the portion of the float on that side of the diaphragm. The water on the other side, however, rises; and with it the portion of the float on that side of the diaphragm. There is, however, one point in the link which, in such case, will remain stationary as regards vertical movement; and that is the point to which the valve-rod is attached. The float will thus act in exactly the same manner as an ordinary float would act with a general rising or falling of the water-level throughout the whole meter; but at the same time the valve-rod will remain steady, notwithstanding any oscillation of the water-level under fluctuating pressures.

Gas-Engines.—Heys, W. E.; a communication from L. Letombe, of Paris. No. 24,133; Dec. 12, 1894.

This invention, relating to gas-engines of the "Otto" cycle type, is carried into effect by furnishing the cylinder end with two valves acting in opposite directions—one tending to open upon a reduction of pressure within the cylinder, while the other tends to close. This latter valve is also operated by a cam or other suitable device from the governor. A chamber of any suitable capacity is situated between the two valves. The first valve, which opens upon a reduction of pressure within the cylinder, has an enlarged stem open to the air, and is normally maintained upon its seat by a weak spring. The second valve, in opening, allows the air and gas to pass—the air passing around the valve, and between it and its seat; and the gas entering through holes formed in the seating.

Upon the commencement of the aspiration stroke, both valves are opened—the first by the reduction of pressure in the cylinder; the second, by the action of the cam. The piston then continues to move forward; and the explosive mixture enters the cylinder. The point at which the second valve cuts off the supply is regulated by the governor, so that the first valve remains open under the influence of the diminishing pressure in the cylinder.

In a double-acting engine, valves are placed at each end of the cylinder; and, in order to avoid the passage of gas from one side of the piston to the other, the piston is divided, or else provided with an annular cavity, which, if desired, may be in communication with the air through a hollow piston-rod.

Gas-Heated Irons, &c.—Eves, J. V., and O'Brien, W. D. and L. F., of Belfast. No. 189; Jan. 3, 1895.

This invention relates to apparatus heated by an internal flame of gas mixed with air—such as smoothing-irons, calendering-rollers, the cylinders or rolls of smoothing-machines, artificers' furnaces, for dental or other work, &c. It consists essentially in constructing a closed combustion chamber, connected with a gas and air supply on the one hand, and on the other with a positive exhaust set up by a fan or other like contrivance, whereby the gas and air are drawn into the combustion chamber, and the products of combustion are drawn into a flue, and thence carried outside the building.

Linings and Shelf-Carriers for Gas-Ovens.—Russell, W., Clare, A., and Fletcher, Russell, and Co., Limited, of Warrington. No. 601; Jan. 10, 1895.

The patentees propose to construct the shelf-carriers or linings of gas-stoves with lugs or projections upon one or both side edges; the lugs on one edge being capable of engaging behind a flange or with a groove formed in either the vertical door-frame or the back-frame of the oven. Upon the lining or shelf-carrier is cast a hook, with a corresponding catch or staple upon the inside of the oven-casing. Alternatively, the positions of the hook and of the staple or catch may be reversed; or, if the lining or shelf-carrier is provided with lugs or projections upon two edges, the second series of lugs engages with hooks or similar devices.

Hot-Plate Grids for Gas Cooking-Stoves.—Russell, W., Clare, A., and Fletcher, Russell, and Co., Limited, of Warrington. No. 602; Jan. 10, 1895.

The object of this invention is to provide means for holding the bars of hot-plate grids of gas cooking-apparatus firmly in place, and yet to enable them to be readily removed and replaced or substituted when required. At each end of the bars is formed any suitable kind of projection, lug, or the like, adapted to fit into corresponding recesses formed in the hot-plate, or to otherwise similarly engage therewith. At one end (preferably the back), there is formed, below each recess on the hot-plate, a flange or corresponding projecting part; and on the corresponding end of each bar is formed a projection or groove, capable of engaging the flange on the hot-plate. At the opposite end of each bar, there is a holding-down device, which may be variously constructed, but which consists preferably of a pin or projection passing perpendicularly downwards through a hole in the hot-plate, and secured by pins, cotters, nuts, or the like.

Internal Combustion Engines.—Wain, J., of Kennington, and Horsey, J. G., of Shortlands. No. 973; Jan. 15, 1895.

This invention connected with internal combustion engines, consists in closing the front end of the cylinder by a cover, gland, stuffing-box, or other means, and making the piston hollow; while ports and valves are arranged in the piston block and cylinder. The back-stroke of the piston draws a charge of gas and air, or vapour and air, into the front end of the cylinder, where it is retained by a valve. The forward stroke compresses this mixture into the hollow piston, where it is retained by a valve until about one-fourth of the return-stroke is completed, when the charge is admitted into the back-end of the cylinder by suitable ports and valves. The further motion of the piston compresses the charge, which is suitably exploded for forcing the piston forward in the usual manner.

Lighting and Extinguishing Gas-Burners Electrically.—Orling, A., and Wollert, O. E., of Stockholm. No. 1085; Jan. 16, 1895.

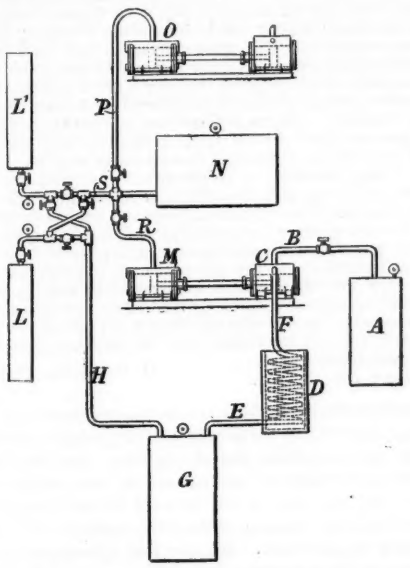
This apparatus for lighting and extinguishing gas-burners is of the class in which an electro-magnet is arranged with its armature in conjunction with a ratchet-wheel upon the plug of a gas-cock, and with a moveable bar of a spark producer, in such a manner that, when the armature is moved, the cock is opened and the spark produced to ignite the gas; and when the armature is again attracted, the gas is extinguished. To effect this, the patentees employ two electrical circuits, one of which serves for igniting the burner, and the other for extinguishing it. For this purpose there is arranged upon the plug of the cock, in addition to the ratchet-wheel operated by a pawl upon the magnet armature, a cam or "snail," which operates two contact-springs in the two electric circuits in such a manner that, when one spring is in contact with a contact-piece arranged in conjunction with it, the other spring is out of contact with its corresponding contact-piece. With this arrangement, when the circuit is closed, the armature will keep on vibrating until the cam upon the plug is rotated sufficiently to break the circuit; and when the other circuit is closed, the same action

will again take place. The spark producer is arranged in conjunction with the armature magnet in the ordinary manner.

When applied to a series of burners (as, for instance, to the burners of the lamps of railway trains), there are arranged in conjunction with the spring-contacts two other contacts, two of which serve for the local burner, and two for conveying the current to the next burner of the series. By this arrangement, the whole series of lamps can be lighted in succession; each succeeding one being operated as the preceding one is lighted.

Enriching Water Gas with Acetylene.—Lake, H. H.; a communication from E. N. Dickerson, of New York. No. 11,848A; June 18, 1895.

This invention mainly relates to a process for increasing the illuminating power of water gas by the addition of acetylene in determined percentage. In the words of the patentee: "If acetylene as an enricher is added to water gas, the illumination at first is very high, but after a few hours decreases. It is, therefore, practically impossible to enrich water gas at the works by acetylene, and thereafter supply such enriched gas through the mains. This invention is, therefore, primarily designed to supply the enriching material to water gas practically at the point of consumption. . . . My process also enables the mixing, in practically predetermined quantities, of two gases—as, for instance, acetylene and air, or acetylene and water gas or coal gas; the whole being automatically controlled. I do not broadly claim to be the inventor of the addition of acetylene to water gas as an enricher; but the present invention is based upon a means of remedying a difficulty never known to exist, and the remedy of which never was discovered until this invention. The difficulty consists in the fact that, unlike other enrichers, acetylene will disappear (in part at least) as an enricher, if it remains in contact with water gas for a considerable time—as, for instance, during the period in which gas is stored in gas-works until its delivery to the consumer. It is also based upon the discovery of the law that, unlike other chemical combinations, the combination of the acetylene, or its conversion into some other hydrocarbon, does not occur immediately, but only after a period of contact between the water gas and the acetylene; and that, therefore, the acetylene can be added at the place of consumption without losing its illuminating power, while it cannot be so added in the ordinary way at the works."



By the process described in the specification, a single main can be used to supply heating and illuminating gas; the illumination being added to such portion of the gas as it is desired to use for illuminating purposes, and the remainder being burned for fuel. It is possible also by means of the invention to mingle the gases under high pressure, as well as under the normal or burning pressure last described, by employing the expanding power of one of the gases to accomplish the compression of the other gas.

For the proper burning of acetylene in ordinary burners, it is important (says the patentee) that the acetylene should be mingled with air, either in equal proportions or in proportions varying from 40 to 50 per cent. of air and 60 to 50 per cent. of acetylene, though, of course, other proportions may be utilized. In his present description, however, he refers to the mingling of equal quantities of air and acetylene. When acetylene gas is prepared from calcium carbide and water, it generates pressures, varying at normal temperatures from 600 to 3000 or 4000 lbs. to the square inch, dependent upon the internal temperature of the generator, which pressure can be utilized by this apparatus to effect the compression of the air to be mingled with it or supplied in a compressed condition. Another convenient source of acetylene gas is from cylinders containing the liquefied gas having (at ordinary temperatures) a pressure of from 600 to 700 lbs. per square inch. By utilizing the pressure of the escaping acetylene from either of these sources, the air is compressed to the desired pressure. This may be accomplished, if low pressures only are desired—say, 30 lbs. to the square inch above zero—by, in the first place, filling a chamber with air, and then allowing an equal volume of acetylene under pressure to enter, thereby compressing the air in the cylinder, and mingling it with the entering gas. The present apparatus is, however, especially designed for higher pressures—say, 150 lbs. to the square inch above the atmosphere—when the tanks containing the compressed gas become useful for transportation on vehicles or for similar purposes.

This part of the invention will be understood from a reference to the accompanying diagrammatic plan of the apparatus, wherein A represents a vessel containing acetylene under sufficient pressure to operate the plant, as, for instance, a vessel containing liquefied acetylene, or a vessel in which, water and calcium carbide being brought in contact, the necessary pressure is established. The pressure of the gas in A is carried by the pipe B to the motor C, operating an air-compressor M. The gas, having done its work in C, is expanded and very cold. Pressure can be restored to the gas, and the cold be utilized, by passing it through a heating-coil D, placed in brine to absorb the cold to be subsequently utilized, or it may be filled with flowing water, thereby adding pressure, if desired, to the escaping gas from the motor Whether such warming coil is required, depends upon the pressure desired in the transportation cylinders L L^1. Escaping from the coil D, the gas passes by the pipe E to the receiver G, of sufficient capacity to retain an excess of gas until it is required for the transportation cylinders. The air passing from the air-compressor by the pipe R, passes through a cock to the pipe S, communicating with the air-receiver N. In case the power of the expanding acetylene is not sufficient to compress the air to the requisite pressure, an additional supply of air may be carried to the receiver N from the air-compressor O by the pipe P.

To charge the shipping cylinders L L^1, it is only necessary in the first place to fill the chamber L with the requisite air pressure from the air-reservoir N. Having admitted, for instance, 75 lbs. of air to the cylinder L, as shown by the gauge, the first cock is closed, and the second one opened, when the acetylene compresses the air in the cylinder L by its own pressure from the chamber G, which must have a pressure in excess of 150 lbs., if that is the desired pressure in L. If 150 lbs. be allowed to enter into the cylinder L from the receiver G, substantially equal quantities of air and acetylene will be contained therein. The cylinder L can then be removed for transportation, by closing the cocks, and the cylinder L^1 can be similarly charged, while an empty cylinder replaces the cylinder L.

APPLICATIONS FOR LETTERS PATENT.

23,003.—Whitehead, J., "Repairing burst or fractured water-pipes." Dec. 2.

23,021.—Sykes, W. R., "Valves for water, steam, or other liquids or gases." Dec. 2.

23,022.—Toms, H. L., and Jackson, A. C., "Incandescent burners." Dec. 2.

23,024.—Griffin, J., and Pinchbeck, W. E. C., "Waste-preventer." Dec. 2.

23,028.—Johnson, S. A., "Burning hydrocarbon or other suitable oils in fire grates, stoves, ranges, or furnaces, for heating, cooking, or other purposes." Dec. 2.

23,046.—Tobler, A. C., "Gas-regulators." Dec. 2.

23,053.—Hantz, M. A. F. A., M. A. L. A., and E. E., "Mantle lamps." Dec. 2.

23,055.—Rickman, W. B., "Automatic apparatus for intermittent gas-lights." Dec. 2.

23,057.—Seeligmann, G., "Lighting material and apparatus." Dec. 2.

23,113.—Wise, W. L., "Gas-engines." A communication from the Buckeye Manufacturing Company. Dec. 3.

23,149.—Burgess, J. F., "Illuminant appliances for gas and other burners." Dec. 3.

23,150.—Burgess, J. F., "Gas-burners." Dec. 3.

23,170.—Thuman, F., "Gas-generators." Dec. 3.

23,179.—Thorp, T., and Marsh, T. G., "Gas and vapour burners." Dec. 4.

23,187.—Harding, R. & G., "Water supply by means of high-pressure cistern and retaining valve." Dec. 4.

23,224.—Bowing, J., "Manufacture of retorts and ovens." Dec. 4.

23,235.—Pitt, S., "Treating heavy hydrocarbons by means of heat, especially applicable for distillation and the manufacture of oil gas." A communication from La Société Internationale des Procédés Adolphe Seigle. Dec. 4.

23,288.—Dunscombe, M. E., "Pressure-regulator for gases or liquids." Dec. 5.

23,303.—Degroux, D., "Gas-lamps for lighting factories, work-rooms, and the like." Dec. 5.

23,323.—Stevens, G., "Indicating the frost or thaw in water-supply pipes, to prevent their bursting and explosion of kitchen boilers." Dec. 5.

23,346.—Bousfield, J. E., "Gas-burners." A communication from the Actiengesellschaft für Fabrication von Broncewaaron und Zinkguss." Dec. 5.

23,370.—Bentley, A., "Exhaust condenser and silencing chamber applicable to gas, oil, or other engines." Dec. 6.

23,388.—Hawkyard, J., and Braddock, J., "Prepayment gas-meters." Dec. 6.

23,417.—Sales, G. de R. de, "Gas and other like engines." Dec. 6.

23,418.—Sales, G. de R. de, "Igniter for gas and other like engines." Dec. 6.

23,514.—Dobbs, A. E., "Meters for water and other fluids." Dec. 7.

23,521.—Trouvé, G., "Producing, storing, and utilizing acetylene gas." Dec. 7.

Gas-Meter Rents at Batley.—There was a warm debate at the meeting of the Batley Corporation last Thursday on the question of abolishing gas-meter rents within the borough from March next. Mr. B. Turner initiated the discussion by introducing a special motion, which he justified on the ground of the large profits which had been made by the gas-works in past years towards the relief of the rates. Nearly £650 a year was realized out of gas-meter rents; and as the profits were made by the consumers, they were, he held, entitled to any advantage accruing in that way. The point of those who opposed the resolution was that out of 6000 meters 1300 were the private property of the consumer; and the question of compensation to the latter class would naturally have to be considered if there was to be any equity at all in the matter. In the end, the motion was withdrawn in favour of referring the question to the Gas Committee.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Extensions at the Plymouth Gas-Works.

SIR,—Will you kindly allow me to correct one or two inaccuracies in the report on the above subject in the last issue of the JOURNAL? You state: "When, some three years ago, the Directors began their present series of enlargements, everything of the most modern description was arranged for. . . . In the carrying out of this work, the Directors consulted Mr. John West, M.Inst.C.E., of Manchester. . . . Mr. West first turned his attention to the provision of the new retort-house," &c., &c.

Now, as a matter of fact, the contract was already let for the new retort-house, coal-store, and gasholder tank before Mr. West first called upon me; and I gave him the letter of introduction to the Chairman which led to the adoption at Plymouth of his stoking machinery and subsequent developments. The new retort-house, coal-store, and gasholder tank have been built as originally designed under my superintendence before Mr. West came near Plymouth; the only alteration due to him being accommodation for his coal breakers and elevators. The plans and specifications for the new engine-room, boiler-house, tar and liquor wells and tanks, boilers, and, in fact, the whole general design, were also prepared under my superintendence; and they have been erected according to those plans.

With respect to my management of the Company's works, I was appointed on March 25, 1890. On that date—

The reserve fund stood at	£14,736 15 7
The balance of the profit and loss account, at . .	26,278 13 10
Total	£41,015 9 5

I left on March 25, 1895, at which date—

The reserve fund stood at	£17,162 12 1
The profit and loss balance, at	23,908 15 8
Total	£41,071 7 9

So that the Plymouth Gas Company pulled through those five terrible years without lowering their reserves at all, and without increasing the price of their gas, which during all that period stood at 1s. 9d. per 1000 cubic feet all round—the lowest price in the world, although we were punished quite as heavily as other undertakings by the increased price of coals and labour. So that I think I can claim that the interests of the Company did not suffer in my hands.

H. TOWNSEND, Assoc.Mem.Inst.C.E.,
Late Engineer and Manager, Plymouth Gas-Works.

Wakefield, Dec. 12, 1895.

The Relative Prices of Crude Naphthas and Benzols.

SIR,—With regard to your quotations for 30 per cent. crude naphtha and benzols, I am very much astonished to see that, although 90's benzols have seemingly risen to about 2s. 4d., 30 per cent. crude naphtha is variously quoted at from 6d. to 9d. in different papers.

Taking crude naphtha at 6d. and 9d., and 90's benzols at 2s. 4d., this shows a difference of from 1s. 10d. to 1s. 7d. in these two quotations between crude naphtha and 90's benzols; whereas the margin during the last two years has, according to my information, scarcely been more than 8d. on an average.

The manufacturer of 90's benzol who continues to buy according to the recent and present quotations of the chemical journals—say from between 6d. and 9d.—does, therefore, now make a profit of say *about three times as much in making it into 90's benzols*.

This state of things is very unsatisfactory for those who, as I know in one certain case, have made contracts based on the quotations of your own valuable paper and two other chemical journals of standing. Naturally the expectation, in basing the contract in question, was that the margin between 30 per cent. crude naphtha and 90's benzol would remain at about the usual average level.

Can you or any of your readers explain how it is that this extraordinary state of things has come about; and would it not, in the interests of the trade, be better to entirely cease quoting 30 per cent. crude naphtha, if, as it would seem from information kindly vouchsafed to me from different sides, it is almost impossible to get reliable quotations for the 30 per cent. crude naphtha?

HENRY SIMON.

Manchester, Dec. 14, 1895.

P.S.—While you quote 9d. for crude naphtha, some other papers still quote 6d.—that is 50 per cent. less than the actual price. Such variations are exceedingly awkward.

The Prices of Ammoniacal Liquor and Sulphate of Ammonia.

SIR,—I very earnestly ask permission to make to you a personal appeal, based on the following particulars: My firm has for about a quarter of a century produced ammoniacal salts from the residual liquors of a considerable number of provincial gas-works. When it was first proposed to us that, instead of making speculative contracts for the purchase of residuals, of one or more years' duration, we should accept the invoices of each weekly or monthly delivery based on the quotations of the JOURNAL OF GAS LIGHTING, although recognizing the advantage of avoiding risky contracts, we nevertheless were unwilling to adopt the suggestion, on the ground that, however capable and honourable the Editor might be in his special sphere, it might reasonably be doubted whether his acquaintance with the movements of the chemical market could be sufficiently intimate to enable him to fix price-levels with the accuracy necessary to form a basis for the invoices of the raw material of manufacture. But observing carefully for a very considerable time that (with very occasional exceptions) your weekly reports accurately recorded market fluctuations, and recognizing the high esteem in which all information given in the JOURNAL is held by the entire gas world, we at length not only adopted the suggestion when again made to us, but have since volunteered to make important contracts on the basis of your weekly quotations. Up to quite a recent date, the ratios between the prices of liquor and sulphate of ammonia have generally been in accord with the actual weekly movements of the market. But during the last three or four months, your figures have failed to represent the "spot" values of liquor, and I presume are intended to denote the prices at which extended contracts have been made, when buyer and seller agreed to recognize that future gains might compensate present losses. My meaning may be made clearer by definite references. Thus—

Date in JOURNAL.	Recorded Price of Sulphate per Ton.	Recorded Price of Liquor per Ton.
Average of the whole year 1892 .	£10 1 9¾	.. 6s. 3¾d.
Average of the whole year 1893 .	12 9 6	.. 8 6
Average of the whole year 1894 .	13 5 9	.. 10 0¼
In 1892—During June	9 12 6	.. 5s. to 6s.
Sept. 27 to Dec. 27 . .	9 18 6 to £10 5 0	.. 6 „ 7
In 1893—Jan. 31 to March 14 . .	10 5 0 to 11 5 0	.. 7 „ 8
Oct. 24 to Nov. 7 . . .	12 5 0	.. 7 „ 8
In 1894—Dec. 25	11 0 0	.. 6 „ 8
In 1895—Jan. 22	10 15 0 to £11 5 0	.. 7 „ 9
April 23	10 0 0	.. 7 „ 8
May 21 to June 4 . . .	9 15 0	.. 7 „ 8

Against these records, I beg to place that of last week, when you still value liquor at 7s. to 8s., although you report sulphate to have reached the lowest on record, and no less than £1 7s. 6d. below the April price of the present year.

It is well known to the initiated that, during the years that are passed, the position of the provincial distiller, basing his purchases on your valuations, has not been an enviable one. Taking into consideration the fact that the manufacture of sulphate is a nine months' industry, rating fairly the wages of superintendence, the cost of repairs, the depreciation of plant (which in a provincial works includes, in addition to the boiler, stills, tanks, pumps, &c., barges and railway tank-waggons), and the expenditure necessarily incurred in quite recent time to meet the requirements of the governmental and sanitary inspectors, it is easily demonstrated that there has never been more than a scant margin of profit.

But this truth would not have induced me to pen this letter. Nothing but the ruinous loss now being sustained through buying on your weekly reported values and selling at the highest obtainable levels, with the knowledge that it will be impossible to recoup later on, constrains me to undertake this most distasteful task, and to risk being thereby misunderstood. It is quite reasonable that all connected with the gas industry should hold in the very highest esteem any information given in a technical journal, conducted with such marked ability as is the JOURNAL. Hence, without any indication in your "notes" that the quoted values are for "time contracts," any representations that may be made by a chemical manufacturer may be expected to be ignored. I beg, therefore, to be permitted to suggest that your notes on market values may give the additional information that sulphate of ammonia is quoted free on board at ports and not free on rail at works, and also to state whether the weekly price of liquor is that of time contracts or of spot deliveries, and whether such price includes delivery at a chemical factory or on the gas-works, as the carriage from many small country gas-works cannot be ignored in making a valuation. Your quotations are more carefully studied by the thousand local gas managers than by the few who are located in populous or commercial centres; and it is with the former that the chemical manufacturer has more intimate relationships.

H. C. BROWN, Ph.D., F.I.C.

King's Lynn, Dec. 14, 1895.

[We much regret the condition of affairs complained of by Dr. Brown, and willingly accord him the help of publicity, which is the only check we can put upon our prices current reporters. Doubtless these gentlemen—whose good faith and competence we have never had reason to challenge—will take note of Dr. Brown's request for such additional information as to the meaning of the prices realized in certain instances as can fairly be published. We take this opportunity for repeating the warning to which we gave editorial expression in the JOURNAL for Feb. 14, 1893 (Vol. LXI., p. 262), in respect of the character and object of these reports. In so far as they have helped to break down the vicious long-contracts system, we are glad to know that our figures are found to be of definite practical use; but it must be distinctly understood that those who base their dealings upon them, do so at their own risk. That our information upon the state of the gas residuals trade from week to week is fairly accurate is, we are glad to note, conceded by Dr. Brown; and it seems proved by his omission to mention any better authority. Perhaps his difficulty would be overcome by the inclusion in his future contracts of a saving clause, permitting of some mutual rearrangement when the reported values of raw and finished products appear to get out of harmony with one another. We shall welcome further correspondence on this subject, and meanwhile acknowledge the temperate manner in which Dr. Brown has put his deplorable case.—ED. J.G.L.]

Old Gas and Water Literature.—A correspondent wants to learn of the present existence of any copies of the three following pamphlets, by William Matthews, the author of "A History of Gas Lighting": (1) "A Letter to the Lord Mayor on Gas Companies," Third edition published in 1828; (2) Facts, &c., Relating to the New River, 1835. (3) Gas Lighting Projects, 1836. Our correspondent says he has made diligent inquiry, and searched a large number of library catalogues—including that at the British Museum—without success. Perhaps some reader of the JOURNAL can help him.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Dec. 11.

(*Before Mr. Justice* VAUGHAN WILLIAMS.)

In re the South Kent Water Company.

This was a petition for winding up the above-named Company, presented by Messrs. James Oakes and Co.

Mr. JENKINS, who appeared for the petitioners, said the Company was incorporated by Act of Parliament in 1889; and it appeared to be an undertaking started and run by a Mr. Easton. In the year 1893, the petitioners supplied pipes, &c.; and in April, 1895, they obtained judgment for £826 9s. 5d., and levied two executions—one on the Company's premises in London (to which the return was *nulla bona*), and the other in Kent, where the Sheriff withdrew on the ground that the goods and chattels in his bailiwick were unsaleable. He believed they consisted principally of pipes underground, with perhaps a pump and a small steam-engine. The creditor had obtained about £50 by garnishee proceedings; and there was a balance of £750 still owing. The petitioners' debt was not disputed; but an affidavit had been filed by the Manager on behalf of the Company, stating that since July, 1895, the deponent had been very active. Up to that time, the only customer was the South-Eastern Railway Company, in respect of their station at Paddock Wood, for which they paid £4 a year. But since July there had been a new Manager, and he said there were now thirty cottagers who wanted water; and it was said that the Company was so much for the public benefit that it ought not to be wound up. He thought it would appear by the evidence that the only persons who were likely to benefit by it were the Manager and perhaps his clerks. According to the Act of Parliament, it was empowered to supply water in the parishes of Goudhurst, Hawkhurst, Tenterden, Cranbrook, and other places; but in the present year, an Act had been obtained by another Company, called the Cranbrook Water Company, which recited that the South Kent Company had not exercised the powers conferred upon them in 1889, so far as Goudhurst, Hawkhurst, and Cranbrook were concerned; and powers to supply those places were now vested in the Cranbrook Company.

Mr. CHUBB, who appeared for the Company, asked his Lordship not to make the order, on the ground that it could not benefit anybody, and would be to the public disadvantage. It was true that up to 1894 they had not been able to do much; but since then they had got the works in order, and were doing a substantial business, which it was hoped would much increase if they had a little further time, and could raise more capital with which to pay off their creditors. He should have thought it was in the petitioners' interest that such an opportunity should be afforded, as they could not get anything by stopping the Company, whereas, if the concern was allowed to go on, there might be a chance of them getting their money.

Justice WILLIAMS asked what the income was last year.

Mr. CHUBB replied that there was practically no income until 1894, because at first the water turned out to be "soda" water, which they could not supply; and when another well was sunk, the water from it was so impregnated with iron that settling-tanks had to be constructed. Thus the funds were exhausted before the Company had an opportunity of giving a supply. They could now do so; and they had already thirty customers, and applications from others. A contract was also pending with the Railway Company which would bring in £150 a year; and another with the Paddock Wood Cattle Company. In these circumstances, they hoped to be able to raise further capital. If the winding-up order were made, the liquidator could not sell the concern without getting an Act of Parliament.

Mr. JENKINS said the Company had no power to borrow; so that further capital could only be raised by shares.

Justice WILLIAMS pointed out that this was so much the better for the petitioners. If money were raised on debentures, they might take precedence of the petitioners; but every fresh share taken up would go to increase their security.

After some further discussion,

His LORDSHIP directed the petition to stand over till the first petition-day in next sittings; but he expressed the hope that, in the meantime, the parties would come to some arrangement.

Friday, Dec. 13.

(*Before Mr. Justice* CHITTY.)

The Incandescent Gas-Light Company, Limited, v. Leggatt and Co.

Mr. A. J. WALTER applied, on behalf of the plaintiffs, for an injunction against the defendants, who, he said, were sellers of incandescent gas mantles which the plaintiffs alleged to be an infringement of their patent; and a writ had accordingly been issued against them. After that the defendants put in their window a statement, which was utterly untrue, to the effect that the Welsbach patent had been cancelled by the Berlin Patent Court, and that the plaintiff Company were spreading lies to frighten the public; whereas it appeared, by an affidavit on behalf of the plaintiffs, that their principal patent had been declared valid by the Court. There were also some circulars pasted all over the defendants' window, containing similar untrue statements to those to which he had already referred. Thereupon the plaintiffs gave notice of motion for an injunction to restrain the issue of these circulars; and he understood that his friend Mr. Cutler was instructed to consent to an order in the terms of the notice of motion.

Mr. CUTLER said that was so.

Mr. WALTER suggested that the defendants should consent to a perpetual injunction, and make an end of it.

Mr. CUTLER said he could not do that.

Justice CHITTY said the injunction would be until the trial or further order; but if the defendants liked to consent before the Registrar to a perpetual injunction, it might be drawn up in that form.

A motion by the Meteor Incandescent Gas-Light Company against the Incandescent Gas-Light Company stood over for a week.

Damages for Injuries Sustained in a Gas Explosion at Idle.

At the Yorkshire Autumn Assizes at Leeds last Saturday week, Mr. Justice Wright had before him an action brought by Mr. Tom Hardaker and Julia his wife against the Idle District Council and Mr. A. Thornton, a Contractor, to recover damages for negligence. Mr. T. Atkinson, Q.C., for the plaintiffs, stated that they lived in a cottage which formed one of a block of buildings in Moorfield Place, Idle. The District Council, during last year, entered into a contract with Mr. Thornton for the purpose of constructing a sewer in the street. When carrying out the work, they found a gas-main, which had a diameter inside of about 3 inches, and which was put down thirty or forty years ago. It was the duty of the defendants to see that this main was properly propped and slung during the operations. The work was begun towards the end of December last year, and was carried on until March. It would be remembered that last winter was a very severe one; and operations were continued during the frost. Hardaker being a mason, was out of work at the time; and his wife earned money by her sewing-machine. When the soil was re-placed, it was frozen so hard that it had to be broken with picks; and it was impossible to pound it down properly. The main belonged to the Airedale Gas Company. It was usual to inform the Company when the mains were to be exposed; but no notice was given in this case. On Saturday, March 16, the tenant of the corner house noticed a strong smell of gas, and called in the inspector, who said he would remedy it. In another house, there was a strong smell; and in the plaintiffs' house, the children had made a complaint to Mrs. Hardaker. But she was suffering from influenza, and had almost lost the sense of smell. About five o'clock, a tremendous explosion occurred in the plaintiffs' house, which ruined it. The dividing-wall between plaintiffs' house and the next was shattered; and the outer wall was blown 18 inches out of plumb. Mrs. Hardaker was sitting near the fire when a great flash of flame almost blinded her; and she was grievously burnt. She was taken to a neighbour's house, and attended by a doctor. The furniture was completely destroyed; and the plaintiffs had to go to a new home. Several witnesses were examined on behalf of plaintiffs; and at the conclusion of their case, his Lordship said there was nothing to show that Mr. Thornton was not an independent Contractor. Mr. Atkinson then asked for judgment for the Idle District Council on the ground that there was not sufficient evidence that they interfered so as to make themselves responsible for the way in which the work was done. His Lordship gave judgment accordingly. Evidence was then called by Mr. Wright, on behalf of Thornton; his Lordship remarking that, if the work was improperly executed, he was responsible. Defendant was examined, and said that the orders of Mr. Nesfield, the Inspector for the District Council, had been obeyed fully in every respect. The jury gave a verdict for the plaintiffs, and added a rider that the District Council were to blame for allowing the work to proceed in such frosty weather. The jury were then dismissed; and the question as to the amount of damages was left to his Lordship, who reserved judgment. On Monday last week, his Lordship awarded plaintiffs £25 for the damage done to the furniture, and £20 for the injuries sustained by Mrs. Hardaker.

A Troublesome Gas Consumer.

Before the Croydon Borough Magistrates last Wednesday, the occupier of 2, Upper Grove, South Norwood, was summoned by the Crystal Palace District Gas Company for money due for gas. The defendant did not appear, nor did anyone attend on his behalf. The Company's inspector, in reply to the Mayor, said their officer had made several attempts to get into the house to read the meter-index; but he had been unable to do so. The door was never opened, although voices could be heard within. The Company had now cut off the gas—the occupier still retaining the meter. The Chief Clerk observed that if the Company's officials had been unable to take the readings of the meter, he did not see how the Company could make a demand for gas supplied. It transpired, however, that the charge had been made for gas up to June last. Police-constable Hornigold stated that, when he went to the house to serve the summons, a woman opened the window, and accepted service that way. She gave no reason for not opening the door. Witness went on to say that the knocker had been removed from the door, and both bell-handles were disconnected. The voices of children could be heard in the house; but no one would open the door. The Mayor made an order for payment within seven days, or distress.

The Main Drainage of London.—At the meeting of the London County Council last Tuesday, the report of the Main Drainage Committee, recommending extensive additions to the main drainage system of London north of the Thames, at a total estimated outlay of £745,000, to which reference was made in the JOURNAL last week, came up for consideration. Mr. M'Dougall moved as an amendment that the general enlargement of the system is not now necessary, but that local floodings need immediate attention. After considerable discussion, the amendment was carried by 55 votes to 18. A recommendation for the execution of certain relief works, at an estimated outlay of £50,000, was agreed to.

Wages at the Newcastle and Gateshead Gas-Works.—The question of the wages paid by the Newcastle and Gateshead Gas Company to certain of their employees for Sundays and holidays, which gave rise a few months back to a dispute which was submitted to Mr. T. Burt, M.P., has been settled by his award, which has lately been issued. The questions put to him were whether the retort-house men should have double pay for work done on Sundays and Good Fridays; and whether the principle of seniority should be recognized in engaging and discharging men. Mr. Burt's replies are as follows: (1) All retort-house men working on eight-hour shifts to be paid time-and-a-half on their existing wages for the first two shifts on Sundays; (2) wages for Good Friday to remain as at present; (3) the engagement and discharge of men to be dealt with by the men's representatives and the Manager as occasion may require. Mr. Burt suggests that the new arrangement should come into operation on the 1st prox.

MISCELLANEOUS NEWS.

CONTINENTAL UNION GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 7, Drapers' Gardens, Throgmorton Street, E.C.—Mr. ARTHUR LUCAS in the chair.

The SECRETARY (Mr. F. W. Himing) read the notice convening the meeting, and also the Directors' report and the balance-sheet. The former was as follows:—

The Directors have to report that the number of consumers on the Company's books on June 30 last at Messina and Montargis—the two stations owned directly by the Continental Union Gas Company, Limited—shows an increase of 269.

There has been, however, a falling off in the quantity of gas consumed, owing chiefly to the earthquake shocks, which continued at Messina for a period of nearly two months at the beginning of last winter, causing large numbers of people to leave the town and disorganizing business generally. The profits at this station have consequently suffered a considerable reduction during the year ending June 30 last.

The total bad debts incurred and written off have amounted to less than £30.

The principal outlay on capital account during the year has been for the erection of a new exhauster and the continuation of the new 10-inch leading main at Messina, for the heightening of the scrubbers at Montargis, and for new mains, services, and public lamps generally at both of these stations.

The Union des Gaz has obtained a concession until 1924 for lighting the Commune of Vaucresson adjoining Rueil, near Paris.

The average length of the concessions of all the towns lit by both Companies is now 28 years.

The Italian State tax on gas referred to at the last meeting of the proprietors has since been voted by the Parliament of that country, and is payable by the consumer.

Turning to the thirteen stations belonging to l'Union des Gaz in which this Company has so large an interest, it will be seen by their report that their net outlay on capital account during the year amounted to £36 988; being for purchase of land at Genoa, Milan, Nimes, and Roanne, new benches at Rueil and Milan, new cooling-main at Roanne, boundary wall at Alessandria, a new station meter and a "Standard" washer at Strasbourg, and new mains, lamps, and services at the stations generally.

The following statistical information relating to the working of the Union des Gaz stations is, as usual, given here:—

There has been a net increase of 679 in the number of public lamps lit by gas; whilst the number of private consumers on the books of that Company on June 30 last shows the satisfactory increase of 5256—making a grand total of 76,606 consumers supplied by that Company at their thirteen stations.

The quantity of gas sold for all purposes shows an increase of 5 per cent. The average cost of coal shows a slight decrease, which is to some extent counterbalanced by the net value of the coke sold having fallen to the extent of 6d. per ton. The net value of tar also shows a decrease of 1s. 2d. per ton; whereas the value of ammoniacal liquor shows an increase of 2d. per ton of coal distilled.

Bad debts incurred and written off profits amounted to £662; being a trifle less than in the preceding year, though the gross rental is considerably larger.

Reverting to the accounts of the Continental Union Gas Company, Limited, it will be seen from the balance-sheet that the Directors have, during the year under review, invested £7555 of the surplus funds in the purchase of 285 shares in the German Continental Gas Company, having their head office at Dessau.

The Directors also have to report that they have authorized the expenditure of some £3000 in setting up a small installation of the electric light at Messina, in order to keep the whole of the lighting of that town entirely in their own hands.

After making the usual charges, the net profits of the Continental Union Gas Company, Limited, for the year ending June 30 last, amount to £116,027 19s. 4d. The available sum to the credit of general revenue is £154,118 7s. 7d., out of which the Directors recommend a dividend at the rate of 13 per cent per annum. The holders of 7 per cent. preference stock participate *pro ratâ* in all ordinary dividends exceeding 10 per cent.; and will therefore receive 10 per cent. for the year. It is proposed that, after deducting the interim dividend paid in July last, of 5 per cent on the ordinary and 3½ per cent. on the preferential stock, the balance of 8 per cent. on the former, and 6½ per cent. on the latter, all free of income-tax, should be paid on Jan. 4 next. The amount carried forward to the new account will be £37,918 7s. 7d.

The Director who retires by rotation is H. W. Blake, Esq.; and the Auditors (A. T. Eastman, Esq., and I. A. Crookenden, Esq.) also retire. All these gentlemen, being eligible, offer themselves for re-election.

The CHAIRMAN said he was sure the proprietors would share the regret of the Directors that the Chairman (Sir Julian Goldsmid) was prevented, by the state of his health, from attending the meeting. No doubt, they were aware that since May last Sir Julian had been suffering from a grievous illness—an illness which had, no doubt, in a measure, been brought on by his constant and unremitting attendance on his various duties. He (Mr. Lucas) would like to take this opportunity of saying to the proprietors that Sir Julian, since he became Chairman of the Company, had not been merely an ornamental Chairman, but had devoted an immense deal of time to the affairs of the Company. He had visited all the stations, attended continuously the weekly meetings of the Board, and had brought to bear on the work his unrivalled experience in the management of Continental gas companies. The proprietors would, he was sure, be glad to hear that, about two months ago, Sir Julian's illness took a turn for the better. His health was certainly stronger; and they had great hopes that, before long, he would be able to attend to their affairs as well as he had hitherto. Turning to the report and balance-sheet, he said they were, on the whole, satisfactory. The Company had earned the same dividend as in the two previous years, and at the same time they were carrying forward practically the same amount. This fair dividend, he was sorry to say, was not due to the two stations owned by the Continental Union Gas Company; because, on the working of those two stations, there had been a decrease in the profit, amounting to £1084. But the shareholders must not be disheartened by this statement. It was due to the fearful catastrophe that visited Messina in the autumn of 1894, and which was repeated about two months ago. It had increased the leakage by 3·02 per cent.; and it had been a wonder to him how any gas had been conducted through the mains, considering what had happened at Messina. With regard to Montargis, there had been in the past year, as in former years, a steady increase. It amounted to £138, which was not bad, taking into account the condition of commercial business on the Continent. So much for the two stations of the Continental Union Company. The Chairman of this Company was in a very peculiar position in addressing the shareholders, because he had practically to speak about the affairs of two Companies; and it was because of this fact that he was most anxious on the present occasion to clear the ground, and explain their relations with the Union des Gaz. The capital of the Union des Gaz consisted, as they knew, of a million sterling, comprising 50,000 shares of £20 each; and of these shares the Continental Union Gas Company held 37,000. The Directors of the latter were *ex-officio* Directors of the Union des Gaz; and, as there were nine Directors on the French Board, the Continental Union Directors were always in a majority. The immense influence they had over the Union des Gaz, and what a preponderating voice they had in the counsels of the French Board, would be self-evident. He was happy to say that this had always worked very well. In all questions of importance, they consulted their colleagues, with whom they had ever worked in harmony. Referring again to the report, the proprietors would have heard that the Union des Gaz had obtained a concession for the lighting of Vaucresson, which was near Rueil—a suburb of Paris. At present, they were only doing a comparatively small amount of business there; but there was a great future before it. They had, it was true, to conduct the gas through a long distance of mains. But building was going on there; and the increase would be steady and continuous. The concession they had obtained would last for thirty years. It was his duty to pass on to a matter which had given the Board a good deal of anxiety, and which was alluded to by the Chairman in his speech at the meeting last year. It was the State tax on gas in Italy. When first they were threatened with an infliction of this tax, it was rumoured that it would be as much as 5 centimes on every cubic metre of gas emitted from the works. Of course, the Directors were much alarmed at this. Some strong representations were made to the Italian Government by nearly all the gas companies in Italy, jointly and severally; and he was happy to inform the proprietors that the Italian Government recognized the justice of these representations, and reduced the tax to 2 centimes per cubic metre, giving power to the Company to collect it from the consumers. It was not fit for him to criticize the wisdom of the policy of the Italian Government; but he thought he might say this, that it was an open question whether it was politic to invite foreign capital into a country, and then to tax it heavily, as was being done in Italy. In saying this, he knew he was speaking under a grave sense of responsibility. It was not, however, only the State tax they had to fear, but the municipal taxes, which were not in any way, he believed, authorized by the Italian Government; and in a particular instance, which he was bound to mention—the town of Milan—his tongue was tied, because the matter was *sub judice*. The town of Milan, so far as the suburbs were concerned, had said: "We will levy a tax of 2 centimes on you, without power to reclaim from the consumers." The Directors denied the justice of this claim; and they would fight it by all legal means in their power. He asked the proprietors to remember, with regard to these taxes, that consumers, when they received their gas bills, looked at the total. They saw it was larger; and they either grumbled or burnt less gas, or they did both. The Company would probably be losers in any case. Whether or not they had power to collect from consumers, was not the question. The Company did not want the taxes; they only wished to go on quietly with their business as hitherto. The next matter to which he had to call attention was one in connection with the financial operations which the Board had carried out, but which was not mentioned in the accounts or report, because it was only completed in November; and the accounts were for the year ending June 30. But before referring to this matter, he would ask the proprietors to go back and remember the events of 1891. In that year, for reasons which he need not repeat, but which they would no doubt recollect, the Directors were forced to call up the balance of £6 on the new shares. The late Mr. Backler, with his usual clearness, explained, at one of the meetings, that they had no alternative, after having taken legal advice. The proprietors accepted the statement; and the amount was fully paid up. The result was they obtained £72,800; and he (Mr. Lucas) thought the time had come when the proprietors would wish to know what had been done with the money. At that time and since, the Directors hoped that towns would be submitted to them that they, in their opinion, would consider worth their while to light. Some towns had been submitted to them; but, with great regret, they came to the conclusion that, if they completed the business with the vendors, it would be much more to their benefit than to the Company's. Therefore, since then, no towns of any importance (only what might be called extensions) had been added to their stations. Failing those towns, the Directors had turned their attention to the purchase of gas shares; and, in this way, they had absorbed £35,000 of the money called up on the new shares, which left £37,800. In the summer of this year, the Union des Gaz decided to issue for purposes chiefly of extensions of works and purchases of land, £80,000 in 4 per cent. obligations. He might state, in parenthesis, that the obligations were bonds; they were not quite the same as debentures (so he was instructed by the French law), but they were redeemable, and would be redeemed eventually. This amount was issued in November; and the Continental Union Gas Company were allotted £60,000. They had taken the whole up; and they had paid for them by the above-mentioned £37,800—the balance being made up by the sale of their Local Loan stock, which brought them in £20,000, and by cash which they had on deposit to the amount of £2200. Now the advantage of this operation would be obvious to the proprietors as business men. They obtained less than 3 per cent. by previous investments, which were mainly in Consols and in other stocks. These they were able to sell at a substantially higher price than they had purchased at. They would hold a first claim on the property of the Union des Gaz, and, moreover, a security which was at any time negotiable. Given a settlement of the troublesome tax question, he saw no reason why the future of the Continental Union Gas Company should not be as prosperous as in the past. As had been mentioned

in the report, the increase of consumers had been 5256; the increase in the quantity of gas sold was 5 per cent.; and what was not stated in the report, but would be interesting, was that the cost of this increased amount of gas sold was £2000 less, which reflected great credit on their Engineers. A chairman of a gas company speaking now was in a more favourable position than he was (say) eight or nine years ago, when first the electric light came into prominence, because he thought people now saw that the electric light was not an unmixed blessing. Also, ten years ago, the incandescent gas-light had not come into being, or, if it had been invented, it was not in a state of perfection. It was far more used on the Continent than here; and people had found out that by it they had a continuously brilliant light, instead of a diminishing one as in the case of the electric light, and that it had other advantages. The proprietors would be interested to learn that they had had several instances of large restaurants all over the Continent where they had abandoned the electric light, and returned to gas in order to use the incandescent light. Coupling this fact with the enormous increase of gas consumed for heating and cooking (they used it far more for those purposes on the Continent than in England), and also the fact that gas was employed more and more every day for motors, there was no cause for apprehension as to the future of the Company. The report stated that the average number of years of the concessions was now 28; but for the large towns, it was above 30 years—in fact, more in some instances. If they were only met with the same spirit of fair dealing on the part of the towns as they had had up to the last few years, they on their side would act, as Englishmen had always acted with regard to foreign companies, with energy and honesty. Foreign municipalities knew very well that they could rely on them—whether in times of war or strike, they would do their best to carry out their contracts, not only in the letter but generously in the spirit; and the Board would do their utmost to maintain the high reputation that they had borne on the Continent hitherto. He then moved the adoption of the report.

Mr. N. E. B. GAREY seconded the motion, which was unanimously carried.

The dividends recommended in the report were then declared, on the motion of the CHAIRMAN, seconded by Mr. R. HESKETH JONES.

The CHAIRMAN moved the re-election of the retiring Director (Mr. H. Wollaston Blake). This, having been seconded by Mr. FREDERICK TENDRON, was agreed to.

Mr. R. STEVENS proposed, and Mr. ROBERT MORTON seconded, the re-appointment of the Auditors (Messrs. A. T. Eastman and T. A. Crookenden); and this was carried.

The CHAIRMAN, in moving a vote of thanks to the officers of the Company and of the Union des Gaz both at home and abroad, spoke of a tour he had made of the stations in France, and stated that he was immensely struck with the way in which the work was carried on. The whole *personnel* there and at home was of excellent quality—men devoted to their duty and enthusiastic in the work they had to perform.

Mr. GAREY seconded; and the motion was heartily agreed to.

The thanks of the proprietors were also accorded to the Directors, on the proposition of Mr. A. F. PHILLIPS, seconded by Mr. J. SOUTTER; and this concluded the proceedings.

THE PROPOSED ALTERATION IN THE ELECTRIC LIGHTING REGULATIONS.

The Report of the Board of Trade Committee.

As mentioned in the JOURNAL last week, the Committee appointed by the Board of Trade (consisting of Lord Kelvin, Mr. W. H. Preece, C.B., and Major Cardew) to consider the desirability of altering the limit of low pressure as defined by the electric lighting regulations, have presented their report, the text of which is as follows:—

That it is expedient to alter the definition of pressure in the above-mentioned regulations, as follows: First, omit the following words: "Pressure on any alternating-current system being taken to be the equivalent of pressure on a continuous-current system when it produces an equal heating effect if applied to the ends of a thin stretched wire or carbon filament." Secondly, in place of paragraphs (*a*), (*b*), and (*c*), substitute the following: (*a*) Where the conditions of the supply are such that the pressure may at any time exceed 500 volts if continuous or 250 volts if alternating, but cannot exceed 3000 volts whether continuous or alternating, the supply shall be deemed a high-pressure supply; (*b*) to be worded as existing; (*c*) omitting "or the equivalent of 3000 volts."

The Committee further advise that the following amendments should be made in the proposed regulations: (*a*) Regulation (1) to read as follows: "Save as hereinafter provided, the pressure of a supply delivered to any consumer shall not exceed 250 volts at any pair of terminals." (*b*) Regulation (31) add, "No such conductor shall be at a higher pressure than 300 volts from earth." (*c*) Regulation (6) for supply omit the words "or less than 45 volts if continuous, or the equivalents thereof respectively if alternating." In place of "150 volts" read "250 volts." Add at the end the following proviso: "Provided that no change shall be made in the pressure of the supply to any consumer in consequence of the issue of these regulations, except with his consent."

With reference to the suggested alteration to regulation (31) for safety, the Committee are of opinion that, to enable the use of 500 volts continuous pressure between the outer conductors of a three or five wire system with bare conductors laid in conduits, the Board of Trade may give provisional sanction to an earth connection being applied to one point of the middle conductor in any case in which they are satisfied that a high insulation is maintained on all other points of the system, and that suitable and sufficient means are provided for the immediate detection, localization, and correction of any fault of insulation.

The Committee consider that, in making the above suggestions, they have indicated clearly how, in their opinion, the question of limitation of pressure should be treated to adequately secure the safety of the public, and to meet the requirements of electric lighting undertakers and the convenience of their customers. They do not, however, wish to insist upon the exact wording suggested, and would leave the final drafting of these amendments, and any consequential verbal amendments of the draft regulations, in the hands of the Board of Trade.

ELECTRIC LIGHTING NOTES.

The Fareham District Council have held a meeting to consider what course they shall take in view of the judgment against them in the action brought by the local Electric Lighting Company to recover damages in respect of the breach of the contract entered into by the Council's predecessors to purchase their undertaking. It will be remembered that the judgment was that the Council should pay damages (£3800) and costs; but time was given them to decide whether they would pay these, or take over the undertaking. At the meeting of the Council, the Clerk read a report on the value of the works prepared by Messrs. De Ferranti and Manville, who expressed the opinion that the undertaking was a losing concern, with no prospect of ever becoming a paying one. If the Council took it over, they considered this could only be justifiably done on the basis of what the plant would fetch if sold by public auction. Under the most favourable circumstances, they valued the plant at £1450, with £300 the cost of obtaining the Provisional Order. If the plant was purchased by brokers, it would not fetch more than about £750. Messrs. Ferranti and Manville having assessed each item in the schedule attached to the proposed contract at what they considered a fair trade price, valued the whole thing as a going concern at £3164; and they could not understand how it was the Arbitrators assessed the concern at so high a figure as £4866. If the Council took over the undertaking, the Board of Trade would be almost certain to order that the wires be put underground, and duplicate machinery provided; while the Local Government Board would not sanction a loan for more than seven or eight years. Some of the members considered this report fully justified the action of the Council; and it was resolved that a poll of the ratepayers should be taken before deciding to pay the damages or complete the purchase.

The Eccles Town Council have been advised by their Electric Lighting Committee to provide the electric light themselves in the borough rather than risk the possibility of power being granted to a Company. They have also recommended that the tender of the Manchester Edison-Swan Company, Limited, to carry out the works for £13,792 be accepted, and that application be made to the Local Government Board for power to borrow £20,000 to enable them to carry out the scheme.

The electric light contagion has spread to Newington, for the local Vestry, sitting at the Walworth Vestry Hall last Wednesday, received a special report from their General Purposes and Lighting Committee on the subject. It should, however, be incidentally mentioned that this go-ahead Vestry would not have thought about the adoption of electricity as an illuminant, had not the County of London and Brush Provincial Electric Lighting Company, Limited, and the Capital and Counties Electricity Supply Company, Limited, first applied to the Board of Trade for a Provisional Order to supply current within the area of the jurisdiction of the Vestry. This audacity on the part of mere registered commercial undertakings fired the Vestry with indignation, and induced them to take the course they did; and the motion that the applications of these two Companies be opposed by the Vestry was almost unanimously agreed to. The Committee also recommended—"That a memorial be sealed and forwarded to the Board of Trade, applying for a Provisional Order under section 4 of the Electric Lighting Act of 1882, for the supply by the Vestry of electricity for lighting purposes, both public and private, within the area of the parish." This memorial is a lengthy document of seven folio pages, and is signed by the Vestry Clerk (Mr. L. J. Dunham). Among the more interesting points it raises are these: That the London Electric Supply Corporation, Limited, were empowered to supply current in the parish by the Act of 1889, but had not completed the mains within the specified time; that the Vestry feel that the time has arrived for them to secure competitive powers with the Corporation; and that "if the main roads of the parish were lighted by electricity, trade would improve, and shopkeepers and others be induced to take the light in preference to gas, more especially if they were benefited in price by the amount of energy supplied." In the discussion that ensued, Mr. R. C. Davis described the proposed Provisional Order as the "thin end of the wedge;" and, though electricity might be a very fine thing, he thought the parish could not afford such a luxury. He hoped the Vestry would pledge itself not to go any further in the matter until the question had been thoroughly threshed out; and thus disarm opposition. Electric light might be made to pay in some districts more fortunately situated than Newington, where some of the streets could not even afford to have gas. St. Pancras had spent £100,000 on electric lighting; and Newington would have to spend £30,000 or £40,000. In Islington, something like £90,000 had been sunk before the installation was opened; and some of the promoters were getting quite alarmed at the way expenses were increasing. In conclusion, Mr. Davis said the Vestry ought to hesitate before putting these burdens on the shoulders of the ratepayers and the working men. Mr. W. Westcott maintained that the object of the recommendation was to keep out a monopoly, and not to follow the example of Leeds and Liverpool, where the ratepayers had to buy out the electric light companies at a high price. Electric light would be made to pay in five years. Mr. Smithers was very enthusiastic over the prospect of the Vestry owning their own electric lighting installation; and he talked glibly of the time "when the whole of the public lighting would be provided for nothing, and a large sum derived in aid of the general rates" from the profits of the undertaking. Further discussion was then stopped by the closure; and the memorial was agreed to and sealed.

At the close of the article in last week's JOURNAL on "The Right of Gas Shareholders to Vote upon Electric Lighting Questions," it was stated that the Reigate Town Council had resolved to apply to the Board of Trade for an Order to enable them to supply the electric light. The Sub-Committee upon whose recommendation the resolution was passed had previously consulted Mr. F. H. Medhurst. The system he advised them to adopt was the high-tension alternating current system. Referring to the district which he suggested should be lighted, he said that the lighting of 117 gas-lamps in the area cost at present £351; and if these were replaced by 117 incandescent lamps of 16-candle power each, the cost, at 3½ per unit (exclusive of lamp renewals) would be £315 per annum, assuming that the lamps were in use ten hours daily. Lamp

renewals would amount to an additional £25 per annum. He estimated the output for private lighting at 80,000 units per annum; and for public lighting, at 21,500 units. His estimate of the capital expenditure was £15,000; of the revenue, £2351; of the working expenses, £1505; and interest and sinking fund, £787. Deducting the two latter items from the revenue left what Mr. Medhurst cautiously termed a "net probable profit" of £58.

It would appear that the St. Pancras Electricity Committee are troubled with a pricking conscience, or to what can one attribute the reason that prompted them to recommend to the Vestry, on Wednesday, that current should be supplied to churches and chapels at a reduced rate—*i.e.*, that charged for public street lighting? It seems that only one church in the parish is so lighted; and the Committee "are of opinion that some concession should be made to further this object." Hence the recommendation, which was further strengthened by the plea that "the mains now extend over a considerable area, and several churches and chapels are in close proximity thereto; and the authorities would doubtless avail themselves of the improved method of lighting the buildings under their charge, if special facilities are offered to enable them to do so." There was little practical opposition to the proposal; but Mr. Vicars thought the ecclesiastical bodies should not pay less than shopkeepers. Dr. Smith and Mr. Menzies strongly supported the recommendation; the latter gentleman using the curious argument that several of the electrical staff were practically idle on Sunday evenings, and would thus be profitably employed. After this proposal was agreed to by a large majority, the eternal "explosion" question again cropped up. It appears that, after the disastrous occurrences of last winter, the London and North-Western Railway Company "made representations" to the Vestry as to the probable effects of an explosion on the Hampstead Road Bridge, should the structure be damaged. The Committee state that "the mains across the bridge are bare copper strip, laid in cast-iron pipes. The Chief Electrical Engineer (Mr. Baynes) reports that this is an unsatisfactory combination; and he recommends that insulated cable be substituted for the bare copper strip, and the ends of the pipes plugged to prevent the influx of gas." Verily, the sad experience of the past is making the Vestry careful; for they agreed to this alteration, which will cost the nice little sum of £170. Nor was this the only amount which the ratepayers had to provide to alter work executed by their own electric lighting representatives. Another trifling item of £260 was asked for because the Regent's Park station is so badly constructed that the Phœnix Fire Office has had to call the attention of the Vestry to the fact that the cables from the switchboard run under the floor of the engine-room. The Chief Electrical Engineer recommends a concrete flooring, and advises "that a fireproof chamber enclosing the cables under the flooring should be made, with a special water service for immediately flooding the chamber should a fire break out;" and the Vestry could not but agree to this expenditure also. The ratepayers must surely regard the Electric Light Department as an expensive, and not particularly astute, body.

The Chairman of the Hampstead Vestry made a startling admission at last Thursday's meeting. He said that the arc lamps for street lighting in the parish "had not hitherto proved a success," and that to increase this system, as urged by a member, would be "a great mistake." Other installations were successful with regard to public street lighting, so there "must be some fault somewhere." To remedy this sad state of things, a representative of the Vestry had an interview with Messrs. Siemens Brothers in order to arrange with them "to take over the entire charge of the whole of the public arc lamps in the Finchley Road for a period of eight weeks, at a reasonable cost." This Messrs. Siemens (who, by the way, constructed the lamps, &c.) agreed to do for the sum of £35 10s., to include all necessary carbons and labour for trimming, &c.; two employees of the Vestry to be temporarily transferred to their staff, and new globes to be charged at 15s. each. After the letter from Messrs. Siemens embodying these terms had been read, Mr. Johnson inquired whether this was really the total cost to the Vestry, or whether a proportion of the firm's engineer would not have to be added to it. The Chairman of the Lighting Committee replied that the charge was inclusive, and was about the same as the Vestry would have incurred themselves. Mr. Farmer thought it was time the High Road, Kilburn, was lighted by arc lamps; but after the Chairman's frank admission, reported above, he sat down a sadder and a wiser man. Nor did the subsequent action of the Vestry tend to raise the spirits of the electricity enthusiasts; for it was decided to "pay the account of Mr. W. H. Preece, Consulting Electrical Engineer, amounting to £150, for preparing plan and detailed estimate of the extension of high and low pressure mains, and arc lighting plant and mains, to the High Road, Kilburn, and West End Lane." So end the financial troubles that had arisen between the Vestry and the eminent electrician; but who but the most sanguine will prophesy a cessation of other troubles in the Hampstead Electricity Department's affairs?

Torquay is still unable to make up its mind upon the question of the electric light. A considerable body of opinion is opposed to the proposal for establishing the generating station underneath the Bath Saloons; and this opposition has been fortified by the receipt of notice from the owners of some neighbouring property, that they will seek compensation if any nuisance is created. On the other hand, a Sub-Committee have reported that in London, where they visited several private electrical stations, they did not find anything objectionable in the working of dynamos near a large concert-room. Another question of interest to the ratepayers of Torquay is whether the works, if established, will prove remunerative. At a private meeting of the Council held a few days ago, the opinion is reported to have been expressed that the estimate of Messrs. Trentham of the cost of lighting the compulsory area would be largely exceeded, but that the town could very well afford to bear the expense. The outcome of much deliberation was a resolution to start anew. The Electric Lighting Committee are to make fresh inquiries as to a central station, the cost of the necessary works, and the probable number of consumers; and in all this they are to have the assistance of another expert.

At the meeting of the Court of Common Council of the City of London last Thursday, Mr. Brooke Hitching asked, in view of the high price charged for the electric light in the City (8d. a unit, in place of 6d. in other districts), whether the Commission of Sewers had the right of purchase at short notice and on equitable terms. Mr. H. T. Gordon, the Chairman of the Commission, said they were about to enter into a contract for public lighting; but it could not be completed until they had decided which was the best system of lighting the minor streets. The Commission would have the option of determining the contract at the end of 7, 14, or 21 years, and, at the end of 21 years, of purchasing the undertaking outright. Meanwhile, the Company would have a monopoly. Alderman Bell, dissenting from Mr. Gordon's view, said there was nothing to prevent any other company from coming forward; and the Commission of Sewers had no power to grant any exclusive right to a particular company. Mr. C. T. Harris said that, though it might be true that any other company could come in, the Commission of Sewers had bound themselves to oppose them; so that practically there was a monopoly.

The following interesting paragraph from last Friday's *Western Mail* does not require comment: "The Town Clerk of Newport (Mr. A. A. Newman), at a recent meeting of a local authority, declared with a good deal of *nonchalance*, with reference to the installation of the Town Hall with electric light, that the Corporation had 'burnt their boats'—meaning that they had absolutely discarded gas. His Honour Judge Owen, who sat at the Town Hall on Thursday, can hardly be expected to join in the exultation with which the Town Clerk viewed the situation. When the Judge entered the court at 10.30, the place was in grey, weird darkness. It was a wet, miserably depressing morning; and to enter the court unable to see the characters in a book, or discern the features of persons six feet away was, to say the least, irritating. His Honour remarked that he considered it very discourteous on the part of the Corporation officials that, knowing the Court had to sit on that day, they did not make any arrangements for having the place lighted in any way. He would retire until there was some light by which the business could be conducted. Collins, the Town Hall keeper, found himself unable to turn on the electric light, because new connections were being made from the main from which the Town Hall was supplied; and the current was temporarily withdrawn. While his Honour was away in his retiring-room, a couple of penny candles were procured, and placed on the bench opposite his Honour's seat, and a couple of others were placed on the Registrar's desk. The Court commenced work amidst this eerie scene; the light being at intervals reinforced by the arrival singly of oil-lamps."

A COMPARISON OF GAS AND ELECTRIC LIGHTING AT HASTINGS.

Mr. A. P. Trotter, B.A., Assoc.M.Inst.C.E., M.Inst.E.E., has presented to the Hastings and St. Leonards Electric Light Company a somewhat elaborate report, in which certain comparisons are made with respect to the photometric power of the electric light and gas light, as found by him on various visits to the seaside places concerned. The report, however, contains so many qualifications, that it is really not worth very much as an index to the standard of the two illuminants. Indeed, Mr. Trotter begins by stating that his tests are supplementary to some made by the Resident Engineer; and he concludes by confessing that a comparison is impossible without further data

The first important tests were made at the works, where a door had been fitted in the doorway, with an opening to allow of the light shining down a dark passage, in which a 10-feet batten was fixed to the wall for the purpose of forming part of a photometer-bar nearly 200 inches in length. On this bar there travelled a carriage, on which was mounted a "relief" photometer designed by Mr. Trotter, and constructed "somewhat resembling a Bunsen, but giving considerably greater sensitiveness;" while suitable black screens were provided. The standard was a Hefner amyl-acetate lamp, the value of which Mr. Trotter took as 0·877 of a standard candle. The instruments for measuring the electric current and pressure were provided at the works; but as alternating currents were used, Mr. Trotter admits that errors of from 0·5 to 1 per cent. "are not unlikely." Neither does he consider that the measurement of the gas consumption was satisfactory; an ordinary 5-light dry meter and a pressure-gauge being used. The upper dial of the meter, registering 2 cubic feet for one revolution, was read, and the time for each quarter revolution taken in minutes and seconds, for purposes of check; and readings by a stop-watch of a number of revolutions were used for obtaining the consumption—the conductor of the tests considering that "errors of 5 per cent. are not unlikely, and even 10 per cent. is possible." The electrical pressure was from 102 to 103 volts, which is higher than usual in the district; and the gas pressure commenced at 35-10ths of an inch, but was much lower when the trials were finished after midnight.

The tests with three Edison-Swan 16-candle lamps gave the following results: 103 volts, 1·82 ampères, 187 watts, 61 total candles, 20·3 candles each lamp, and 3·2 watts per candle; one Edison-Swan "Sunlight" 100-candle lamp gave 102 volts, 2·46 ampères, 251 watts, 103 candles, and 2·43 watts per candle; three "Gabriel" 16-candle lamps gave 102 volts, 1·7 ampères, 173·4 watts, 52·5 total candles, 17 candles each lamp, and 3·03 watts per candle. With gas lighting, a "Christiania" burner showed for a consumption of 6·2 cubic feet per hour 13·4 candles, or 2·16 candles per cubic foot per hour; a similar burner with globe, 6·2 cubic feet per hour and 7·9 candles, or 1·27 candles per cubic foot per hour; Bray's burners, 3·4 cubic feet per hour; 39 total candles, 13 candles each, or 1·15 candles per cubic foot per hour; a batswing burner, 1·6 cubic feet per hour and 38 candles, or 2·38 candles per cubic foot per hour.

As a result of his tests, Mr. Trotter says the cost of 1000 candle-hours in each case is to be compared; and he does this as follows: "Let gas be at 3s. 2d. per 1000 cubic feet as at Hastings and St. Leonards, and let the gas-burners give 2 candles per cubic foot. Then 1000 candle-hours evidently cost 1s. 7d. Again, let the price of electric supply be 6d. per unit, and let the lamps take 3 watts per candle. Then 1000 candle-hours cost 1s. 6d. To this must be added lamp renewals, which may be taken at 1½d.; making a total of 1s. 7½d. But Mr. Trotter does not let the thing stand at this; for he urges that the

comparative cost of lighting must be considered on a wider basis than that of light for light, and he brings in the "saving" in the cost of re-decoration and the "absence of injury" to "delicate goods" as an argument in favour of electricity. He then boldly ventures to assert that there must be an especial advantage for the electric light in Hastings, "where the very high pressure of the gas doubtless forces much unconsumed gas into the air." The fact of shopkeepers rejecting the electric light because it does *not* suit "delicate goods" is not referred to; nor are the various other disadvantages which are associated with electric supply as at present understood.

Mr. Trotter compared the cost of lighting the sea-front by arc lamps with equivalent lighting by Welsbach incandescent gas-lamps. Taking 33 cubic feet of gas as giving 500-candle power, he made the cost 1·254d., or with renewals 1·43d. for a naked light of the above-named power for an hour, exclusive of the cost of lamp-lighters, cleaners, damage by wind and water, repairs, and interest on capital outlay. Mr. Trotter was given to understand that each arc lamp takes 15 apparent ampères at 50 apparent volts, or 600 true watts, and that for a service of 160,000 lamp hours per annum, including the supply of carbons, trimming, cleaning, repairs to 52 lamps and lanterns, and interest on capital outlay for lamp-posts, transformers, and mains, the sum of £1300 is paid. This comes to 3¼d. per unit, or 1·95d. for a light, reduced and diffused by corrugated glass, of a mean of about 500-candle power for one hour. If incandescent gas-lamps were used, a larger number of smaller lights would, he says, be employed in order to obtain better distribution, as it would be obviously impracticable to group burners together to give 500-candle power. All the incidental expenses would thus be increased in proportion, although, owing to the better distribution of light which would then be possible, some deduction might be effected in the total light. He concludes that comparison is impossible without further data. But he says it is clear that the difference of 0·52d. would not cover the incidental expenses; and that, if the two systems of lighting were placed on equal conditions, the cost of gas lighting would largely exceed that of the contract for electric light.

The Gas-Works Purchase Question at Ossett.—The Ossett Corporation yesterday week resolved that a statutory meeting should be convened for the purpose of considering the question of the promotion of a Bill in Parliament, either alone or conjointly with the Horbury District Council, for the purpose of acquiring the works and plant of the Ossett Gas Company, compulsorily or otherwise.

Gas Affairs at Newcastle-under-Lyme.—The Newcastle-under-Lyme Town Council have agreed to make application to the Local Government Board for sanction to the borrowing of £2500 for the following purposes: (1) The laying down of a new 6-inch gas-main to Keele village, £1500. (2) The extension of the gas-main at Basford, £500. (3) The enlargement of the gas-main in Liverpool Road, £420. (4) The purchase of a piece of land near the gas-works, £80. The extension to Keele village is subject to a proper agreement being executed by Mr. Sneyd, whereby he agrees to pay a minimum rental of £250 a year for ten years, for a gas supply to Keele Hall and village. Regarding the illuminating power of the gas, the Gas Manager (Mr. W. Winstanley) has been instructed to consider the best method of raising the illuminating power of the gas 2 candles for the next two months. The minimum illuminating power allowed is 14 candles; but for last month the average has been very slightly under 16 candles.

The Ystrad Gas and Water Works Purchase Bill.—The Bill which is to be promoted in Parliament by the Ystradyfodwg District Council, in which they seek powers to purchase the Ystrad Gas and Water Company's property, and to construct additional works, has been submitted to a meeting of the ratepayers. Mr. W. Jenkins, the Chairman of the District Council, presided, and proposed a resolution consenting to the Bill. The new works, he stated, would be erected near Craig-y-Llyn, and would cost about £70,000. Several of the ratepayers present objected to the purchase of the gas-works, in consequence of the "fact" that the electric light was rapidly "superseding" gas-light in the largest towns in the country. Other ratepayers from Rhondda Fach opposed the resolution, because they were supplied by the Pontypridd Water Company with water, and if the works were bought, they would have to bear a portion of the financial burden. Several speakers upheld the action of the Council; and eventually the resolution was carried almost unanimously.

The Birmingham Corporation Water Bill.—A meeting of ratepayers of Birmingham was held last Saturday week to authorize the application to Parliament in the ensuing session for an Act empowering the Corporation to make certain deviations of the aqueduct sanctioned by the Corporation Water Act of 1892, to construct an additional short line of railway, to acquire additional lands, and for other purposes. The Mayor (Mr. J. Smith) presided. The Chairman of the Water Committee (Alderman Lawley Parker) made a statement regarding the proposed powers, which are already well known to interested readers. With regard to the land required for depositing spoil, Alderman Parker said they needed one or two acres of land for every mile of aqueduct, which would amount to a considerable aggregate. They had instances of landowners whose property was very far removed from any large centre, asking six or seven times as much for their land as the Corporation had paid for land within six miles of the Town Hall. He did not hesitate to say that the very announcement of their intention to go to Parliament had already effected for them a saving which would more than pay for the Bill itself. The short length of railway they desired to lay down was required to carry material from their quarry at Rubery to the service reservoir at Frankley. It would take 200,000 tons of stone to form concrete to line the reservoir; and 200,000 tons of cement, sand, bricks, ironwork, coal, and other things would also be required. In the opinion of the Engineers and the Water Committee, the saving which would result by the laying down of the railway would pay its cost, and at the finish they would have it for other purposes. No further capital expenditure would be necessary in consequence of the Bill; on the contrary, they believed capital expenditure would be saved by it. After some discussion, the resolution was carried, with only one dissentient.

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Tuesday at the Offices, Southwark Bridge Road—Alderman Sir H. E. KNIGHT in the chair.

The SECRETARY (Mr. Alfred Jelley) read the notice calling the meeting; and the report of the Directors was taken as read.

The CHAIRMAN observed that during the many years he had presided over them, he had never attached his name to a more important report than that which they were about to consider. It contained business of a very large and complicated character, and he thought it was thoroughly satisfactory in itself; for although they were living in times of great pressure for all water companies' undertakings, yet the report detailed circumstances showing that their Company was in a thoroughly sound position. Turning to the accounts, he stated that the charges under the head of maintenance in the past half year had been £48,847, against £41,276. The excess of £7571 was explained by the three items against which asterisks were placed, indicating that the large increase had been caused by the extraordinary expenses arising out of the long and exceptionally severe frost of last winter. These three items amounted together to £29,690, or £7282 more than the combined sum in the corresponding period of 1894. The remaining £300, making up the increase of £7571 under the head of maintenance, was due to the increased amount paid to the Thames Conservators. The total charges under the head of management amounted in the past half year to £9282, against £7936 in the September half of 1894, or an increase of £1346. If, however, they referred to the item of law and parliamentary expenses, they would find that the amount paid in the past half year had been £2959, or £1666 more than in the corresponding period of the previous year. The increase in this item alone therefore exceeded by £300 the total increase under the head of management. He hoped they would pardon him if he again referred to what he called the iniquitous manner in which expenses were thrown upon the Water Companies by the London County Council. The expenditure forced on them by that body had been no less than £10,000 in the past five years; and in the present half year, the outlay which they had been put to had been £3000. Similar expense had been incurred by all the other Companies. It was, he maintained, iniquitous that men who were striving hard to do their duty to supply the public with one of the most important articles they required, should be subjected to these attacks, and mulcted in such enormous expenses in defending what the shareholders, on the faith of Parliament, regarded as their own. The County Council had also been harassing them by endeavouring to get the flush for water-closets increased from two to three gallons; and the scientific evidence which the Company had had to produce before the Local Government Board would cost them about £400 more, if not a still larger sum. This only showed the character of the attempts which were made to carry out the principle of spoliation towards the Companies, with a view of buying their undertakings cheaply—a principle which he had condemned, and which every honest man, he believed, must in his heart also condemn. If they multiplied their own expenses by those of the eight Companies, and added on those incurred by the London County Council on their side, they would find that about £250,000 had been squandered through the action of the Council, without one iota of good having been done. The expenditure to which the Companies were put came out of the pockets of the shareholders; but ultimately it came from the consumers, as the expenditure deferred the time when the Companies could reduce their charges. He believed that but for the cost which had been thrown upon them by the County Council, they would be paying a dividend of 10 per cent. to the shareholders and charging less to the consumers. The attack on the Companies was a public scandal; and it ought not to be permitted to go on. The amount available for transfer to the dividend and interest account was £60,713, against £65,606 a year previously. This showed a decrease of £4893. But as they had paid in the increased expenses he had referred to no less than £8917, their position was so sound that they had been able to discharge out of the revenue £4000 for the extraordinary charges mentioned, so to say without feeling it. The revenue for the half year had been £122,396, compared with £118,821 in the September half of 1894; and he considered this increase of £3575 was highly satisfactory. It was only a temporary cloud which had been hanging over them; and it was now disappearing. The increase in their revenue for the three years 1893, 1894, and 1895 amounted to £14,607, or an average improvement of nearly £5000 per annum—a fact which was most satisfactory to him, because years ago, when he was fighting their battle, and substantiating the value of their property in the arrangements made with the late Mr. Smith, he only took £4000 as their average annual improvement. His calculations generally had been based on that rate of progress; and therefore he thought he was within the mark in any financial statement which he had put before them. Out of the £60,713, they had first to pay the interest and dividend on their debenture and preference stocks. The balance applicable to dividend was £32,152, from which they proposed to pay a dividend of 6 per cent. per annum; leaving £1291 to be carried forward, as compared with £5169, making a difference against them of £3878. On the other hand, however, they would have the increase of revenue which would accrue in the coming six months, although next half year they would experience a very tight pinch. They could not have paid the 6 per cent. dividend now proposed had the whole of the expenses which had been thrown on them by the frost been brought into account—namely, £27,000. At their last meeting, he said he thought that the amount would be £20,000; but he had not realized at the time, nor had their officers, the expense which would be required to repair the roads. They had thus had to pay this half year on account of these extraordinary expenses £17,000, instead of the £10,000 he had expected. They felt that it was hardly fair to put the whole of this expense on the shareholders in any one year; and the Government Auditor (Mr. Stoneham) had consented, after a good deal of explanation and argument, to allow £10,000 to be carried to suspense. He wanted them, however, clearly to understand that the Directors would be bound by the arrangement made with Mr. Stoneham to pay off this amount next half year. He saw no reason

why they should not do this; but they would only be able to do so by reducing the dividend next time to 4 per cent. per annum. He hoped that after that they would again revert to their 6 per cent. He thought it was highly satisfactory that their business was in such a prosperous condition that it enabled them to meet such a large expenditure with the sacrifice of an average of 1 per cent. dividend for two years. They had paid £17,000 in the past half year towards these expenses, or £7000 more than they had anticipated. But for this, they would have had the additional £7000 to carry forward. Passing to the report, he stated that the increase in the domestic supplies in the half year numbered 947, giving them an estimated annual additional rental of £1994. Considerable progress had been made with the reservoirs at Hampton. They told Parliament that they intended to push on as quickly as possible with these works, in order to meet the requirements set forth in the report of the Royal Commission of 1893. They applied for powers to construct extra reservoirs, giving them storage capacity of 546 million gallons, which would represent about 15 or 16 days' supply, whereas at the time they only had 1½ days' storage. Since then, they had completed a reservoir holding 90 million gallons, or 3 days' supply; and another reservoir was progressing very well, which would give them 300 million gallons, or something like 9 days' storage —making in all 13½ days' supply. He thought that Parliament would say they had behaved thoroughly satisfactorily in the way in which they had carried out these works. There was no doubt that the report of the Royal Commission of 1893 was a most able one, and one which would carry more weight with it than any other report on the water supply. The Commission was composed of men who understood the matter; and he was quite satisfied that the House of Commons would always treat the conclusions arrived at with great respect. What the Company had so far done was to obtain powers to construct works which were urgently necessary; and they had carried out their promise to Parliament to proceed with the works with every rapidity. They would, however, only carry the Company on to about the year 1900 or 1902. But they were determined to be ahead of any possible future requirements in their district, and they therefore felt that the time had arrived when they must go to Parliament again with a complete scheme based on the recommendations of the Royal Commission, which would carry them up to the year 1940, the date with which the Commissioners dealt. They could do nothing less than this if they wanted to reply to the charge so frequently made against the Water Companies—especially by the London County Council—that they were not taking those steps which they ought to take to meet the requirements which would come upon them, and that they were effete, and unable to supply their districts. Their desire was to submit to Parliament a scheme which would show that they were not only not effete, but fully alive to the responsibilities of their position. They realized the emergency of the situation, and were prepared to do what the Royal Commission said that they ought to do—construct works by degrees, as the population increased, and thus allay any fear on the part of anyone that they would be unable to supply their district fully with water. That was why they stated in the fourth clause of their report that they were going to Parliament for a Bill, which would be explained at a Wharncliffe meeting to be held at a later date, when he would go more fully into what the Bill proposed. It would not be in good taste for him to express any opinion with reference to the result of the inquiry as to increasing the flush of water from two to three gallons for water-closets. This would, he contended, be nothing more nor less than an exorbitant waste of water.

A SHAREHOLDER: If the flush is properly constructed.

The CHAIRMAN assented. Continuing, he expressed a hope that there would be no alteration in this matter. The eight Bills which were introduced into Parliament last session by the London County Council for the transfer of the undertakings of the Metropolitan Water Companies were not to be pushed forward, as they saw by a report which had appeared in the newspapers of that day. The reason of this was simply that the County Council could not get their obnoxious views agreed to. The cost of defending the interests of their Company alone in connection with these Bills had been £3000, the whole of which had been wasted. As regarded their debenture stocks, they had all been converted into one, known as debenture stock "A," and had been put on a sound basis. A Stock Exchange quotation had been obtained; and they at present had only one class of debenture stock. With respect to the question of superannuation, there were four gentlemen in their service whose ages ranged from 68 to 73, and who had rendered the Company efficient and good service—some of them for as long as 40 years. The Directors thought it was only right, and in the interests of the proprietors, that those gentlemen should now be allowed to retire. They were willing to do so, and were grateful to the proprietors for entertaining the question of their retirement. The Board would not have made this recommendation unless they had been enabled, owing to their possession of such an excellent staff, to adopt a system of promotion by which they would be able not only to pay the proposed pensions to those who retired, but also to get their offices filled by younger and more energetic men. In these days, they required all the energy they could obtain. They would, too, be able to effect a saving in salaries; so that, in addition to the advantages he had mentioned, the Company would be benefited to the extent of about £400 a year as a financial transaction. This was a position which a large Company ought always to be in. Special resolutions would be submitted to them with respect to these proposals. The pensions were based on the Government system of so many sixtieths, which they felt that no one could cavil at. He had no doubt whatever that the shareholders would agree with what was proposed; but the matter rested with them entirely, as did also the salary of the Secretary. He concluded by moving the adoption of the report and accounts.

Mr. C. M. VIALLS seconded the motion.

Mr. W. B. JEFFREYS said that the Chairman had been good enough to explain various matters of great interest to them; but he thought it was premature to state that the dividend would have to be reduced next half year to 4 per cent. per annum, in view of the increase in their income and the savings which would be effected in those items of expenditure against which asterisks had been placed. The whole of this additional outlay had been stated to be exceptional; and therefore they might hope to escape them in the coming half year. He quite agreed with the recommendations of the Directors regarding their old servants.

Mr. CLENDON called attention to the waste of water, especially in the winter, and said he believed that in the provinces the municipalities who had control of the water supply sent round notices to the consumers that if they wasted the water they would be fined. He believed, too, that fines were imposed.

The CHAIRMAN stated that that was so.

Mr. CLENDON said he had no doubt that was what would happen in London if the water supply got into the hands of the County Council.

The CHAIRMAN said that he believed that would be so. He trusted that the anticipations of Mr. Jeffreys in connection with their next dividend would be realized; and he (the Chairman) would do his best with that object. It had, however, been his duty, as Chairman, to tell them what he thought might be the case. He then put the resolution, which was carried unanimously.

Resolutions were afterwards passed declaring the dividends recommended, and re-electing the retiring Directors (Mr. S. Green and Mr. N. Whiting) and the retiring Auditor (Mr. T. P. Child).

Further resolutions were subsequently passed permitting the Secretary, the Supervisor (Mr. G. N. Paine), and Mr. Henry Phillips and Mr. W. B. Pembrooke (Collectors) to retire as from the end of the current year on pensions arranged on the basis mentioned by the Chairman. The proposed salary of the newly appointed Secretary (Mr. Montague Watts) was also approved; and further resolutions were next passed assenting to a donation of 20 guineas towards the maintenance of the Hampton schools for the year 1896, and an annual donation of 5 guineas, on certain conditions, towards the maintenance of the Hampton Hill schools, to commence from the 1st prox.

An Extraordinary General Meeting was held subsequently, and

The CHAIRMAN proposed a resolution authorizing the creation, issue, and disposal of the £750,000 debenture stock sanctioned by the Company's Act of 1894. He explained that it was not necessary to take a special vote on every £100,000 they wanted to raise. They therefore asked for authority to raise £750,000, and to issue it yearly, half yearly, or as they found circumstances required. The new debenture stock would be termed "B;" and it would differ from the existing "A" stock, which was perpetual and bore 4 per cent. The "B" stock would be redeemable at par in 25 years from the date of issue; and it would have to be issued at a rate of interest which would produce the least possible amount of premium.

Mr. VIALLS seconded the motion, which was carried unanimously.

A cordial vote of thanks was then passed to the Chairman and Directors, and to the Secretary and the Engineer (Mr. J. W. Restler, M.Inst.C.E.).

The CHAIRMAN acknowledged the vote on behalf of the Board, and expressed his pleasure at the names of the Secretary and the Engineer having been included in the vote.

The SECRETARY said he was greatly indebted for the vote which had just been passed; and he also desired to thank them sincerely for the kind manner in which they had agreed to the resolution which the Directors had been good enough to recommend to them respecting the retiring pensions.

The proceedings then terminated.

GRAND JUNCTION WATER-WORKS COMPANY.

The Half-Yearly General Assembly of this Company was held at the Offices, No. 65, South Molton Street, last Wednesday, under the presidency of Mr. FREDERICK TENDRON.

The SECRETARY (Mr. J. Goodwin) having read the notice calling the meeting,

The CHAIRMAN said he was quite sure that the consumers of water in the neighbourhood of London, and in London itself, would not soon forget the terrible frost of last February. He referred to this matter at their meeting in June; and he also mentioned the serious loss which it would cause to the shareholders of the London Water Companies. At the time, they had but little idea that it would amount to so large a sum. As regarded their Company, the loss was not less than £20,600; and it had to be distributed among the various classes of shares. Their Act of Parliament very clearly defined the manner in which the dividend was to be paid; and the point of the "C" and "D" shareholders having to bear their proportion of the loss when the profit was not sufficient to pay either 7 per cent. or 7½ per cent. was as clear as possible. Unfortunately, both had suffered—the "C" shareholders to the extent of 1 per cent.; and the "D" shareholders to the extent of ½ per cent.—representing respectively £1540 and £1000. The balance—over £18,000—was to be borne by the "A" and "B" shareholders. This was equal to a dividend to them of 2½ per cent.; and as they paid for the year 6½ per cent., it showed that—apart from the exceptional frost, and the weather in the early part of the year—they would have earned more than the 8½ per cent. dividend which for many years they had been accustomed to receive. Unfortunate as was the money loss, he unhesitatingly said that, as far as the feelings of the Board were concerned, they had suffered more from the distress which they knew had been caused throughout the suburbs of their district. Among the misfortunes which had fallen on them, was the shortening of the life of their late esteemed Engineer, Mr. Alexander Fraser, who, in spite of all the difficulties against which he had to contend, was always so kind, willing, and hard-working that, although the consumers frequently used (both in writing and speaking) harsh and sometimes very bad language to that gentleman, they generally apologized afterwards, soothed by their late Engineer's urbanity. There was not a member of the Board who had not regarded Mr. Fraser as a personal friend. But for the fact that they had faced the difficulties lately experienced, and had determined to lower their mains, and thus prevent the freezing of the smaller pipes in their suburbs, he should never feel safe from one year to another from the effects of frost. He had, however, been told that it would not matter if the mains were lying in the road exposed to frost, so long as a constant flow of water was kept up in them—that the

reezing of their smaller mains was chiefly owing to the freezing of their connecting pipes, thus checking the circulation of the water. They hoped to be able to keep the actual cost of lowering the mains to about the sum mentioned in the report—£15,000. How much of this sum would have to be charged to capital, and how much to revenue, would very much depend on the view taken by the Government Auditor, Mr. Stoneham. Some of the rich London Companies might like to have the whole of the expense debited to revenue—this would, for instance, suit the West Middlesex Company admirably. But he did not think it was at all a right principle. It would operate rather prejudicially to the view of the Directors of the Grand Junction Company, that half of the amount should be charged to capital and half to revenue. However, whatever the figure might be that was arranged with Mr. Stoneham—who always discharged his duty with great firmness, but at the same time with much consideration—they would charge half in the first half year, and the other moiety in the second half year. He contended that, as their Act of Parliament prescribed that the dividend on the various classes of their shares was to depend on the earnings of the year, nothing could be fairer or more desirable in the general interest than that an exceptional charge like this should be spread over the whole year. One of the great advantages of this was that the price of their shares in the market was not so much affected; and although this did not concern the Board, who would not think of selling their shares—and very few of their shareholders thought of doing so—yet none of them liked to see their shares go down if this could be avoided. In spite of the smaller dividend, their "A" shares stood in the market at 110-15 for the £50 share, which was precisely the price at which they stood two years ago; while the "D" shares were quoted very much higher than they were two years ago. The last transaction in them which he saw was at 98¾; whereas the highest price at which the "D" shares were issued was 92. They were at the present time very anxious to have some more money. There never was a big Company like theirs which had so small a cash balance; but they had felt that they could not ask the public to buy their 7 per cent. shares until they saw that they were certain of getting that rate. They had therefore gone on as best they could. But now they were through their recent difficulties, and saw that the 7 per cent. was more than earned, they would offer by public auction, as Parliament required, possibly some £20,000 of the "D" shares; and thus put themselves in the financial position which they ought to hold. If they had suffered very much from the frost and the temporary indignation of the public—indignation which was not justifiable but excusable, although the public had put the blame upon the Companies instead of upon circumstances—he unhesitatingly said that they now held a much better position towards the public and in Parliament than the Water Companies had held for years. They had also to congratulate themselves on the altered nature of the London County Council. At present, that body seemed to indicate a desire to deal with the Water Companies on a juster basis than formerly; whereas their one effort previously, as far as one's experience went, had been to depreciate the value of the property of the Water Companies as much as possible, so as to buy it as cheaply as they could. He was sorry also to observe that there was just a little touch of that feeling still animating the London County Council; because the present policy of the Council was to negotiate for the purchase of the Water Companies' property, and to hold over the Companies' heads the threat that, if they did not succeed in these negotiations, their policy would then be to agitate in Parliament to get greater power of control (as they called it) over the Water Companies. All this meant, "Get power over the Water Companies; intimidate them if you can; and buy them as cheaply as possible. No matter whether you are acting on a right principle or not, get them cheaply under any circumstances." He feared that this would always be the spirit of a purchaser, and even of the regenerated London County Council. If, however, he complained a little of that body, he had to complain most bitterly of the conduct of their ambitious officers, who were mainly responsible—on account of the advice they gave to the Council—for the treatment the Water Companies had had to undergo, and for the enormous parliamentary and other expenses to which they were constantly being put. At the Wharncliffe meeting to be held later on, a resolution would be submitted to the shareholders in connection with the Staines scheme, which he would deal with only briefly on the present occasion. The main principle of the scheme was to bring the water by its natural flow of gravitation from above Staines to the reservoirs that would be made upon their ground, so that the three Associated Companies—the New River, the West Middlesex, and themselves—could get their supply from a higher point of the river, where it was less open to surface deterioration, than where they were obtaining their present supply from. It was also intended only to take the water at its natural flow, when the river was running its normal course, which might be taken at something like 600 million or 700 million gallons per day of 24 hours. There were times in very dry months when the flow of the water was inadequate for the supply of London and for maintaining the navigation; and this would be taken into account by them. There was also another very unfavourable time for the Companies to take the water—that was when the river was in flood. For the purposes in view, a large reservoir divided into two, and capable of holding 2500 million gallons, would be made and kept charged with water; and when the river was in flood or affected by drought, instead of the water running from the river, it would be closed off and allowed to flow from these reservoirs. He now asked the meeting to give special attention to what he was going to say. The Engineer of the London County Council, making a report upon the Staines scheme in its entirety—for at one time it was supposed that six of the Companies would take part in it—put the supply of water required daily at 240 million gallons; and he estimated the cost on a method of his own (which he was pleased to say was based on the various Companies' figures) at £21,250,000. In addition, Mr. Binnie put the annual cost for pumping and maintenance at £430,000. He (the Chairman) thought that even the public would admit that, when an Engineer of position gave certain figures, the question was not on what he based them, but on their reliability to convey right information, and not to mislead. Mr. Binnie's estimate was on a daily supply of 240 million gallons. The present scheme framed by Mr. Hunter and Mr. Middleton was for a daily supply of 85 million gallons for the three Associated Companies—consequently for a supply of more than one-third of that contemplated for the six Companies; and, in addition, they were to have a larger proportion of water storage. Nevertheless, the estimate of Messrs. Hunter and Middleton for the whole expense, including the purchase of the land, was under £1,000,000. These were the plain facts; and he (the Chairman) only hoped that they would go before the members of the London County Council, and that some inquiry would be made into this matter; because it was abominable that the public should be deceived, and put in enmity towards the Water Companies, merely to satisfy the ambition of individuals. Mr. Binnie's estimate of the cost of maintenance and of pumping was, as he had said, £430,000 per annum; whereas the estimate submitted to the Directors for over one-third of the quantity of water originally contemplated was under £10,000. He would leave Mr. Hunter to fight out these figures with Mr. Binnie, with the same satisfaction and assurance as he had in the result of the fight "A Water Director" recently engaged in with Mr. Cripps in the columns of *The Times*. After expressing his readiness to answer any questions, the Chairman concluded by moving the adoption of the report and accounts.

Mr. FRANCIS TAGART seconded the motion. He observed that, with the exception of Mr. Noel Whiting and of Lord Knutsford (whose absence he was sure they all regretted, as it arose from illness), he was their oldest Director; and, as their Chairman for some time, he was brought into constant and immediate contact with the late Mr. Fraser. He, therefore, was fully aware of the great value of that gentleman's services to the Company. Like many modest men, he was a very able man; and he placed his services, and his whole heart, at the disposal of the Company. He had left their works in excellent condition. When he was Engineer, he never incurred any unnecessary expense; being always economical, although he never scrupled to recommend an outlay which he thought was necessary for the well-being of the Company, and to enable them to discharge their duty to their customers. Their deceased friend, in brief, did his duty both to the Directors and the shareholders.

Mr. R. A. M'LEAN desired to point out that the Company's net revenue in the past half year was only £42 less than that of the September half of 1894. He wished to mention this, as some of the absent shareholders, who did not understand the position of things, might take an erroneous view of the decline in the dividend, which had been entirely caused through the exceptional expenditure on account of the frost in the previous half year. As regarded the action of the London County Council, that body had from time to time attacked the Water Companies, causing them to expend thousands of pounds every year in order to defend their property. If an action were brought against one individual by another, the plaintiff would not be allowed to retire from his action till he had paid the costs of the defendant. So far, however, as the Water Companies were concerned, the County Council could attack them *ad lib.*, and could put their hands in the ratepayers' pockets to pay the costs. Apparently, it was a principle of our law that there was no grievance without a redress; but so far as the action of the London County Council towards the Water Companies was concerned, it seemed to him that the Companies had a grievance, and that they had no redress. He hoped that some of the legal luminaries on the Board would devise some scheme by which this state of things could be altered.

Hon. SYDNEY HOLLAND (a Director) remarked that it was not to the interest of "legal luminaries" to do so; in fact, they believed that the London County Council existed as a sort of Barristers' Benevolent Institution. (Laughter.)

Dr. LEESON urged the lowering of certain mains in particular, and expressed a hope that there would be no turning off of the water this year; it being, he said, owing to this circumstance that a great deal of distress was caused in the late frost. When the water was kept running through the main, there was a very fair chance of people getting the supply they required. He felt that he could not sit down without adding his personal tribute to the great loss which the Company had sustained by the death of Mr. Fraser, whom he knew for 35 years.

Mr. WALTER HUNTER, M.Inst.C.E., stated that the mains were receiving every attention. Dr. Leeson might rely upon it that everything would be done to put them in the best possible position; and they would be lowered wherever it was necessary to do so. He quite agreed with what had fallen from Dr. Leeson with respect to keeping the water running in the pipes. They were making special arrangements, so that even if the water was turned off at the houses, a certain amount of water would run through the Company's pipes. He thought the experience of most companies last year—companies in country places—was that, if they kept the water flowing, there would be less chance of the pipes freezing than if they turned the water off. This was even more important than lowering the mains.

The CHAIRMAN then put the motion, which was carried unanimously; and, subsequently, he proposed the payment of the dividends recommended. In answer to a question, he stated that in future the "C" and "D" shares, in Statement No. 1 of the accounts, should be respectively so indicated.

An Extraordinary General Meeting of shareholders was then held.

The CHAIRMAN stated that the meeting was in connection with the superintendence of the engineering department, as to which promotion had been given to various officers of the Company. Mr. Goodman, who had long had the superintendence of the works at Kew, and had of late years control of the works at Hampton, was now the general surveyor of all the works of supply; while the works of distribution had been put into the hands of very old servants of the Company—Mr. Leggatt and Mr. Peck, with the general supervision of Mr. Alfred Fraser, the son of their late Engineer. It had, however, been felt absolutely necessary to have the services of an experienced Engineer. A man who would give his whole time to the Company was not easily to be found; and they felt it would be of great advantage to the Company at present to obtain the willing services of their friend and colleague, Mr. Hunter, who had had much experience of their works, and who, as they were all aware, had rendered enormous services, in conjunction with the late Mr. Fraser, to all the London Companies. He had not intended to say so, but Mr. Hunter had never received a

shilling of remuneration for these services; the amount contributed by the London Water Companies, after a great deal of pressure, being so disgracefully small that Mr. Hunter declined to take any of it, and it was all handed over to their late Engineer. He trusted that by the adoption of the Staines scheme, Mr. Hunter would have some pecuniary profit—at all events he would have his pride and ambition gratified in having introduced a scheme which was so beneficial to the Water Companies—beneficial, however, not pecuniarily, but as enabling them so much better to discharge their duties to the public. He concluded by proposing the following resolution: "That, in consideration of the time and attention which Mr. Hunter will, during the vacancy in the office of Engineer, devote to the supervision of the engineering department of the Company, the proprietors hereby authorize the Directors to pay to Mr. Hunter special remuneration at the rate of £500 per annum, pending the filling up of the office of Engineer." The amount mentioned was very small; but nevertheless Mr. Hunter was satisfied with it.

Mr. TAGART seconded the motion, which was at once carried unanimously.

Mr. HUNTER, in reply, expressed his gratitude to the shareholders. He had taken all along a very deep interest in the Company and its affairs; and he would do his best to safeguard their interests in every way from an engineering point of view. He afterwards paid a warm tribute to the late Engineer, whom he had known for 30 years.

A cordial vote of thanks to the Chairman, Directors, and staff was afterwards passed.

The CHAIRMAN, in reply, assured the proprietors that the Directors would continue to fight the Company's battle to the best of their ability. If their opponents counted on intimidating them, and getting their property from them because they were afraid, he could only say that those gentlemen were utterly mistaken. He had full confidence in Parliament. If property like theirs were taken away from them, the circumstance would weaken property throughout the kingdom. The one thing against which they had to guard was being frightened.

The proceedings then terminated.

THE WATER QUESTION AT EASTBOURNE.

Considerable correspondence has taken place between the Duke of Devonshire, the Chairman of the Eastbourne Water Company, and the Eastbourne Town Council, in respect of the water affairs of the borough; the Council having given notice of an application to Parliament for acquiring powers to establish their own water-works, as previously reported in the JOURNAL. In the first letter, signed by the Mayor (Mr. J. A. Skinner), the Council state that owing to serious complaints, the water supplied by the Company had been examined by several eminent chemists; and the complaints had been ascertained to be well founded. "The Corporation are advised," the letter proceeds, "that it is absolutely necessary to obtain a new source of supply; and it would appear from the communications which have been sent to the Council, that the Company are advised to the same effect." The Water Company are then requested to receive a deputation from the Council, for the purpose of discussing the position and the terms upon which the Company are prepared to sell their undertaking to the Corporation. The Duke of Devonshire, in reply, says: "I observe that the terms of the notice given by the Corporation of their intention to apply to Parliament for a Bill to acquire the undertaking appear to indicate the intention on the part of the Corporation to take advantage of the temporary difficulties recently encountered by the Company with the view of depreciating the value of the undertaking in the event of its being ultimately acquired by the Corporation. Under these circumstances, and having regard to the fact that the Company are not desirous of disposing of their undertaking, it appears to me that, until the proposals of the Corporation and the Company are more clearly defined by the Bills which they respectively intend to submit to Parliament, a meeting such as is suggested would be premature." The Town Council next informed the Company that there was no thought or intention of limiting the discussion in any way by anything contained in the parliamentary notices, which, as usual in such cases, had been framed to meet all possible contingencies, and were therefore drawn in very wide terms; and the Council expressed their anxiety for an interview, in the hope that an exchange of opinions might lead to an amicable arrangement. The letter concluded by again asking that an interview should take place, with the understanding that, if it was not satisfactory, no future reference should be made to it, so that the interests of neither party might be prejudiced by what had been said. This is how the matter stands at present, with the additional fact that the Eastbourne Medical Society have passed resolutions approving of the action of the Council.

Vaughan and Brown, Limited.—The Directors of Vaughan and Brown, Limited, have declared an interim dividend for the six months ended Sept. 30 last, of 7 per cent. per annum on the preference shares, and 5 per cent. per annum on the ordinary shares.

The Chemical Works of the Bradford Corporation.—The Bradford Town Council last Tuesday approved of resolutions adopted by the Gas and Electricity Committee, accepting the offer of Messrs. G. Scott and Son, of Liverpool, to supply and fix at the Frizinghall Chemical Works, for the sum of £1350, plant required in an extension of the works, and advancing the salary of Mr. Wyld, Manager of the works, by £30 per annum.

Dorking Water Supply.—The Dorking Water Company are now making investigations for the purpose of acquiring a new source of supply from Betchworth Park. They have already entered into negotiations for the purchase of the powers to obtain additional water from the Deepdene Estate; and in consideration of this action, the Dorking District Council have resolved to postpone for three months their proceedings to establish water-works of their own, in order that the Company may not be hampered in their efforts to provide an adequate supply of water to the entire district.

METROPOLIS WATER SUPPLY.

Proposed Constitution of a Public Water Authority.

As briefly mentioned in the JOURNAL last Tuesday (p. 1191), the London County Council had presented to them on that day by the Parliamentary Committee a long report on the water supply of the Metropolis, in which it was proposed that a Public Authority should be constituted by the Government to acquire the existing undertakings and generally carry on the business. In view of the importance of the report, we reproduce it in full.

On Oct. 15, 1895, the Parliamentary Committee submitted the following recommendation to the Council: "That, desiring that the supply of water in the Metropolis and the surrounding districts should be in the hands of a Public Authority, and with a view to a complete agreement with all parties concerned over the entire area supplied, the Council do invite Her Majesty's Government either to deal with the question themselves or to appoint a Royal Commission to do so." The following amendment to that recommendation was moved by Mr. Stuart, but rejected: "That the Bills for the purchase of the London Water Companies be proceeded with." The debate on the recommendation having been adjourned, the Council on the 22nd of October adopted the following amendment: "That, the Council having decided not to proceed with the suspended Water Bills, and desiring that the Council should be the Water Authority for London, it be referred to the Parliamentary Committee to report to the Council, without delay, the lines on which they suggest that the Government should be asked to legislate."

As regards the decision of the Council not to proceed with the Bills, it will be remembered that, as introduced, the Bills contained in clause 6 an express direction that the Arbitrators, in determining the value of the undertakings, should have regard to various circumstances tending to lower such value, and further provided that no addition should be made in respect of compulsory sale, and that no allowances should be made for back dividends beyond a period of six years, or in regard to any assumed increase of rateable value. The Committee of the House of Commons did not adopt the proposals contained in this clause, but stated, through the Chairman, that they "wished the Arbitrator to have it in his discretion to accept all the evidence, if any, and to give such effect, if any, to the considerations submitted to him as he in his discretion should think right."

The Chairman subsequently re-affirmed this view, and stated the decision of the Committee—"not in any way to fetter or reduce the power of the Arbitrator to consider fully whether he should give any, and what, sum, and on the question of whether any addition shall be made to the fair and reasonable value of the undertaking in respect of compulsory sale, if in his discretion he should think fit to do so. Our object is to leave the Arbitrator as perfectly unfettered with regard to that question as can be."

The Council thereupon submitted a substituted clause, to the effect that, in ascertaining the value, the Arbitrator should consider all the circumstances of the case and the contentions of both parties, with power to deal with the same with an absolute and unfettered discretion, and as fully and as effectually as could be done by Act of Parliament. This clause would have committed the ratepayers of London to purchase the undertakings at whatever price the Arbitrator in his discretion might award; including, if he thought fit, an allowance for compulsory sale and back dividends. Purchase on such terms would be contrary to the policy which has hitherto prevailed at the Council, and ought not to be undertaken without full consideration of the probable financial effect of such purchase upon the rates.

The following quotations from reports of the Parliamentary and Water Committees presented respectively in February and September, 1891, show the strong feelings entertained against an arbitration such as was proposed by the Metropolis Water Supply Bill introduced by certain Vestries in that year. The Parliamentary Committee pointed out that such an arbitration "would impose on the trustees the trust not only of purchasing the whole of the existing works, but also of constructing new water-works and supplying water from new and independent sources—a policy to which it can scarcely be conceived that the inhabitants of London ought to stand committed. It is probably no exaggeration to affirm that, whereas a totally new and satisfactory series of works might be provided at an estimated cost varying from £10,000,000 to £15,000,000, this extraordinary scheme might cost London, if carried out as proposed by the Bill, some indefinite sum approaching £50,000,000." The Water Committee stated that, if the Companies' undertakings were purchased on ordinary arbitration terms, "it is no exaggeration to say that London might in this manner be made to pay from 30 to 40 millions in purchasing the undertakings of the Companies, and might then find itself obliged to spend from 10 to 20 millions more in providing a new supply. This would in all probability be the result of an obligatory immediate purchase on arbitration terms; and such a purchase must therefore be resisted at all hazards."

The Parliamentary Committee, in recommending the Council on the 15th of October last to invite the Government to deal with the question, were actuated by considerations which it is desirable to explain. The County of London, for which the Council in its resolution of the 22nd of October expressed the desire to be the Water Authority, is one-seventh only of the area of which the water requirements, according to the report of the Royal Commission of 1893, have to be considered. The area of possible supply of the eight Water Companies is 620 square miles in extent, of which that of the County of London is 121 square miles only. The area of Greater London—*i.e.*, the City and Metropolitan Police district—embraces 701 square miles. Outside this area again are certain outlying districts covering about 144 square miles which, in the opinion of the Commissioners of 1893, should be included within the water area. The total area, the water requirements of which have to be considered, is therefore 845 square miles. For the purpose of this report, we describe this area as "the water area."

The districts outside the county, though only containing at present a population of 1¼ millions, or one-fourth of that of the County of London, may by 1931 (in the event of the estimate of the Commissioners

as to the total population of the water area by that date proving correct) possess a population exceeding that of London. It is largely the growing needs of Outer London that will render the provision of new or improved sources of supply necessary. The water question is one of the greatest importance to Outer London as well as to Inner London; and as suburban villages are rapidly growing into populous towns, the necessity for providing efficient means of preventing pollution of sources of supply is of increasing importance in the interests of all concerned. It is therefore essential for the complete settlement of the question that a body should be created which shall represent the interests and command the confidence of the water consumers throughout the water area. The experience of the Council in connection with the Water Bills of last session proves the justice of this view.

The system of water management and distribution which was contemplated by the Council when it resolved on July 3, 1894, that the Bills should be prepared, is shown by the proposals submitted by the Council to the conference of representatives of the outside authorities held on July 30, 1894. The proposals were as follows: (1) That the Council should be placed under the obligation to supply water to the local authorities outside the county, but within the area at present supplied by the Metropolitan Water Companies, upon such terms as may be agreed or decided by arbitration. (2) That any local authority outside the county should have the option either (*a*) of purchasing on suitable terms so much of the works of distribution as is appropriated to the district of such local authority, with the right to a supply of water in bulk from the London County Council on terms to be arranged; or (*b*) of having water supplied direct by the Council.

It is clear from these proposals that the Council had then in view the system which has been generally adopted in provincial towns. The corporations of such towns in many cases supply the consumers of the outside districts direct; in other cases, they supply the district authorities with water in bulk, for distribution among their own consumers. In almost every case, however, the control of the sources of supply remains in the hands of the corporation; so that, while there may be several distributing authorities, there is but one supplying authority. There is, no doubt, much to be said for this system; but the fact must be faced that the authorities of the districts surrounding London were practically unanimous in declining to accept it when put forward by the Council. The Chairman of the Middlesex County Council stated that the proposals of the London Council were "entirely unacceptable, not only to Middlesex, but also to Surrey and Kent;" and he contended that, "inasmuch as the sources of supply are beyond the County of London, and are within the Counties of Hertford, Middlesex, and Surrey, those counties should have the right, if they think fit, of purchasing, by such machinery as should be approved, the portions of the undertakings appropriate to the county."

In consequence of this contention on the part of the outside authorities, the Council consented to a most serious departure from the system originally contemplated. The London Council agreed to give to the Surrey County Council the option of purchasing not only works of distribution, but also a portion of the sources of supply. That principle having been once conceded, the Council were committed to the policy of complete severance of the outside districts from London; and agreements having that object were accordingly entered into, or were under consideration, with various authorities. The question of apportioning sources of supply presented considerable difficulties; and it has yet to be shown that these difficulties could have been settled to the satisfaction of all parties. Even assuming that the difficulties could have been ultimately overcome, the result would have been to create several Water Authorities, and to sacrifice all the advantages in the direction of uniformity and economy which would be secured by unification of the supply.

Regarding the matter from the point of view of the agreements actually entered into, and supposing it conceivable that similar terms could have been arranged with the other authorities, we contend that those agreements would have been of doubtful advantage to the London ratepayers, seeing that they dealt only with the present sources of supply, and left the most important and pressing question of future supply untouched.

Having regard, therefore, to the existing circumstances of the case, we recommend that the Government be asked to constitute by Act of Parliament a Public Authority for the whole water area. As regards the composition of that authority, we do not think it desirable at the present moment to indicate any specific lines on which the Government should be asked to proceed. For the Council to propose any scheme would probably be at once to invite opposition on the part of the other authorities concerned; whereas the Government could approach the subject from an entirely independent and impartial point of view.

As, however, the Council will doubtless look to us for some expression of opinion on the subject, having regard to the desire expressed by the Council that it should be the Water Authority for London, we may quote the words of the report of the Select Committee presided over by Sir William Harcourt in 1880, as fairly representing our views: "Without prescribing the composition of such body, your Committee are of opinion that it should include elements to be derived from the Corporation of London and the Metropolitan Board of Works, together with a due representation of the districts at present supplied by the Metropolitan Water Companies which lie beyond the jurisdiction of the Corporation and the Metropolitan Board." Taking this proposal as a basis, we would suggest a body composed of members nominated by the London County Council, the City Corporation, and the Home Counties, with the addition of nominees of the Local Government Board, and of a sufficient number of co-opted members possessing special knowledge and qualifications. No doubt special provision would have to be made in any case for such authorities as Croydon, Richmond, and Tottenham.

We propose that the Act creating the Water Authority should confer upon it full power to purchase the undertakings of all or any of the Companies by agreement, and, failing agreement, to apply to Parliament to determine in what manner and on what conditions purchase shall be effected. Pending purchase, the Water Authority should be invested with the powers of control now exercised by the Metropolitan Authorities under the Metropolis Water Acts and certain of the powers of the Local Government Board, such as the power of instituting inquiries into the quality and quantity of water. We believe that there would be distinct advantage to the water consumers if those powers were now concentrated in the hands of a single authority, as it would tend to simplify and expedite procedure. In the event of purchase of all or any of the Companies not being effected, an inquiry should be held into the statutory powers and obligations of the Companies and the control exercised over them, with a view to Parliament being asked, if found desirable, to make the obligations and control more complete.

Pending the constitution of the Water Authority, we think the Council might usefully take steps with a view to facilitating the acquisition of the undertakings of the Companies. In February, 1894, prior to the introduction of the Transfer Bills, the Council authorized negotiations to be entered into for the purchase of the undertakings, or one or more of them, at a fair and reasonable price; but they at the same time insisted on certain conditions as the basis of such negotiations, which conditions in themselves involved the more serious points at issue affecting value. The bare resolution was communicated to the Companies, whose replies made it evident that they were not prepared to negotiate on these terms, though some of them expressed willingness to consider any definite proposal which might be made to them.

According to our view, no serious attempt has hitherto been made by the Council to negotiate with the Companies; and we think that every consideration now points to the desirability of this course being taken without any delay. Notices have just been issued by three of the Companies—viz., the Grand Junction, New River, and West Middlesex—of their intention to introduce a Bill into Parliament next session for the construction of large storage reservoirs to carry out the Staines scheme; and the Council will have immediately to consider the course to be taken with regard to the Bill. If the Council should adhere to the opinion expressed by the late Council in February, 1895—that the true solution of the problem of future supply is the provision of a new source rather than the extension of present sources—it might be necessary for the Council to oppose the Bill. Such opposition would involve a long and expensive contest before Committees of Parliament; and it would obviously be to the advantage of all concerned if, by friendly negotiations, agreements could be arrived at between the Companies and the Council for the transfer of the undertakings. Such agreements could be embodied in the Act constituting the new authority, but would, of course, be provisional until sanctioned by Parliament. We recommend that the Council authorize negotiations to be initiated by the Parliamentary Committee with the Water Companies, for the purchase of their undertakings; and we suggest that negotiators be appointed to act on behalf of the Council.

As regards the question of future supply, we think it highly important, especially in view of the Bills being promoted by the Companies, that the Water Committee should bring up its report on the subject with the least possible delay, in order that the Council may be in a position to take such action as may be necessary for the due protection of London. If the Council is satisfied that no scheme for storage of the Thames and Lea waters would adequately meet the future wants of London, and that resort to a distant source is the only alternative, then it may be the duty of the Council to take steps to secure the requisite water areas before they are absorbed by other large communities. The acquisition need not involve any obligation on the Council or the new authority to undertake the expense of bringing the supply to London. This might be postponed; the essential thing being to secure the area required.

The following are the recommendations which we think the Parliamentary Committee should submit to the Council:—

(1) That Her Majesty's Government be invited: (*a*) To constitute by Act of Parliament a Public Authority for the water area defined above. (*b*) To vest in such authority, when constituted, the powers now exercised by the Metropolitan Authorities under the Metropolis Water Acts in reference to the Water Companies, and certain of the powers now possessed by the Local Government Board, with a view to improved administration and efficient control. (*c*) To confer upon such authority power to negotiate for the purchase of the respective undertakings of the Water Companies, and to give effect to such purchase in such manner as may be found expedient, and, if thought fit, to seek parliamentary powers for the acquisition of the undertakings otherwise than by agreement, and for dealing with the whole question, including that of future supply.

(2) That, pending the constitution of such authority, the Council do authorize negotiations to be initiated by the Parliamentary Committee with the Water Companies for the purchase of their undertakings.

(3) That, with a view to the Council coming to a decision on the pressing question of new sources of supply as compared with a scheme of storage reservoirs, the Water Committee be instructed to report their final conclusions without delay.

The consideration of the report was adjourned till to-day.

Colonel Hughes has given notice to move as an amendment to add the following words: "And that the operation of the following clause in the order of reference to the Water Committee be suspended until further resolution of the Council thereon—'the Committee shall conduct any negotiations with the Water Companies for purchase or otherwise which may be authorized by the Council.'"

The Metropolitan Vestries and the Water Question.

A Conference of Metropolitan Local Authorities, convened by the Vestry of Kensington, was held at the Kensington Town Hall last Tuesday, "to consider the desirability of legislation being promoted to secure for the ratepayers adequate control and supervision over the water supply of the Metropolis." Out of the total of 43 Local Authorities in London, only 16 were represented; the absentees including such important and populous districts as Islington, Battersea, Bermondsey, Hackney, Shoreditch, Mile End, and Lambeth. Major-General WEBBER, R.E. (Kensington), presided.

The CHAIRMAN, in opening the proceedings, remarked that the question of the water supply of the Metropolis was one which presented difficulties of a most intricate character. There was in London a population of 5,400,000, of which number the River Thames supplied 54½ per cent.; the Lea, 27½ per cent.; and wells, &c., 18 per cent.

The eight Water Companies of the Metropolis supplied, on an average, 28·29 gallons per head per day for domestic uses; and that employed for public purposes was a little more than half this amount. With regard to the quality of the water, which had of late been much canvassed, the report of Professor Frankland was most encouraging. It was necessary, while taking into consideration this subject, to have regard to the point as to where new sources of supply were to be found. Calculating up to 1930, supposing there were an extension of London boundaries, there would be a population of something like 11 million. It was a fact, however, that the sources of the Thames and Lea had never been fully investigated, and their resources never fully taxed. For the purchase of the Companies between £40,000,000 and £50,000,000 would have to be raised. The eight undertakings of the London Water Companies had spent something like £15,500,000. The shareholders should not be deprived of their just rights and revenues; and consequently the question of compensation would arise. They must not lose sight of the fact that, out of the £15,500,000, a very large proportion was underground in the shape of mains, &c., the value of which was very deceiving. The origin of the present conference lay in a series of resolutions passed by the Kensington Vestry with respect to the London Water Supply. These resolutions expressed the desire that some authority should be constituted which should have control of the eight Metropolitan Water Companies, but that the authority should not be the London County Council. The Vestry were of opinion that the purchase of the Companies' undertakings by that body was most undesirable. What they wanted was the creation of some authority which, while giving the ratepayers supervision over the water, and having power to inquire into the supply, should not take from the Companies their rights and privileges. The question of compensation for the loss sustained by the Companies was, of course, one for arbitration.

Mr. G. N. Watts (Kensington) moved the first resolution, which was as follows: "That, in the opinion of this Conference of Metropolitan Local Authorities, it is desirable that any legislation dealing with the water supply of the Metropolis should be in the direction of the passing of an Act which, without unduly hampering the operations of the several Companies, shall provide for the supervision and control of the existing undertakings, rather than for their purchase."

Mr. T. Huggett (Kensington) seconded the motion.

Mr. J. Liddiard (Wandsworth) moved, as an amendment—"That, in the opinion of this Conference of Metropolitan Local Authorities, it is desirable that any legislation dealing with the water supply of the Metropolis should be in the direction of the passing of an Act which shall provide for the constitution of a Water Trust, to consist of persons to be elected by the London County Council, the Corporation of London, the Thames Conservancy, and the sanitary authorities north and south of the Thames within the area of Greater London referred to in the report of the Royal Commission, which Trust shall have all the powers necessary to control and manage the water supply within such area."

Mr. H. J. Hunter (Hampstead) seconded the amendment.

On being put to the vote, the original motion was lost by a large majority; and the amendment then became the substantive motion. On its being submitted,

Mr. W. R. Sayer (Fulham) moved an amendment to the effect that the Water Companies should be bought out, and that the governing authority should have on it a majority of representatives of the London County Council.

This amendment was defeated; and the substantive motion was thereupon put and carried.

The following resolution was agreed to without discussion: "That, in the interests of the Metropolis, it is expedient that Her Majesty's Government should forthwith promote legislation for the carrying out of the proposal indicated in the foregoing resolution, and for the creation of the necessary authority, which should, in its constitution, be representative of the ratepayers of the areas supplied by the London Water Companies."

After adopting a resolution providing that copies of the foregoing resolutions should be sent to the Prime Minister, the President of the Local Government Board, the London County Council, and the various Metropolitan Authorities, the conference closed.

ALLEGED DEFECTIVE RESERVOIRS IN CORNWALL.

The St. Germans Rural District Council have been peculiarly unfortunate in their schemes of water supply. Frequent reference has been made in the Journal to the defective state of the reservoir which has been constructed for the supply of Millbrook; and it now appears that a leakage has been found in the reservoir which supplies Torpoint, another of the villages on the Cornish bank of the Tamar. At a meeting of the Council last Thursday, reports were presented with reference to both matters. In accordance with the decision of the previous meeting (see *ante*, p. 1040), a deputation visited the reservoir, and also waited upon Mr. H. Masterton, the Engineer. Mr. Parsons, a member of the Council, said a visit to the pure water chamber of the reservoir revealed the fact that the water was coming in on all sides to a very large extent. They were all satisfied that the work was very incomplete, and that there must be a considerable outlay in order to put the reservoir in a proper state. Mr. Masterton, whom they afterwards saw, admitted that there was a grave defect as far as the pure water chamber was concerned; and he proposed that it should be remedied by certain work being done. He also admitted that other parts of the works were defective, including the filter-beds; but he said that this might be accounted for by subsidence of the land. The deputation left Mr. Masterton with the impression that he would go carefully through the whole of the work, and report to the Council as to what should be done. As to the Crafthole reservoir, which supplies Torpoint, a report was made by Mr. S. W. Jenkin, C.E. This stated that a shaft had been opened at the back of the outlet well, in order that an examination might be made of the mouth of the adit through which the main pipes run. This shaft was filled with good puddle; a brick wall at the back of it closing the mouth of the adit. The water came freely into this shaft from the reservoir on both sides, and rose immediately to the same level as the water in the reservoir; thus showing that the pitched slopes were not water-tight. Openings had been made in the pitching along the south-west side of the reservoir; and the clay puddle had been found to be of very inferior quality, and very irregularly laid—apparently following the slope of the natural ground instead of being laid underneath the pitching. This portion of the reservoir could not be considered water-tight. Two or three shafts had been sunk along the puddle wall and the large bank. This was found to be good up to a certain height, above which ordinary peat soil had been used, which was not water-tight. The result of the examination had been to confirm the opinion that the most serious leakage took place at or near the outlet of the reservoir, and began when the depth of water had reached 10 feet. To remedy it, he suggested that a layer of concrete a foot thick should be placed over the pitching, and carried to the level of the overflow, so as to make it water-tight; the inferior material in the puddle wall of the tank to be removed, and replaced with good puddle, and the imperfect pitching to be taken up and reset in good puddle. The cost of these works would be £300. Mr. Jenkin also pointed out that the mode of taking water into the main from the reservoir was open to objection, because all the water was drawn from the bottom of the reservoir instead of from various heights; and he recommended that a cast-iron outlet tower, with proper valves, should be provided. It was decided that Mr. Jenkin should carry out the works he suggested.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At the present moment, the electric light is being boomed in Edinburgh by the Corporation Committee. The occasion is a proposal to double the producing plant. Professor Kennedy has been applied to; and he has furnished a report which is written in a spirit of gleefulness at the success which has attended the venture. He recalls that in his former report he proceeded on the assumption that in three years the Corporation might have 40,000 lamps wired; whereas they have now, in a fourth of that time, equivalent to 45,600 lamps wired. He gives figures as to the working, showing that, in the 37 weeks to the end of this year—the summer half year—during which the installation will have been running, the income, including the amount derived from public lighting, will have amounted to £7750, which is at the rate of 4·85d. per unit; and that the expenditure will have been £8252, or at the rate of 5·14d. per unit. He does not say whether the income, so far, has been actually received, or if it is only a computation from the number of units which are, or will be, indicated as having been sold. But in the matter of expenditure, he gives a proportion corresponding to the period run for the charge in respect of interest and sinking fund, so that the figures he gives are admittedly problematical. He does not call attention to the fact; but it is manifest from his figures that there will be a loss on the working of about £500. I suppose he expects that the profits during the winter months will come in more freely than during the summer; and he goes on to say that by the middle of April, by which time the installation will have run a year, there will be a credit balance of between £2000 and £3000. He recommends, and the Committee have adopted the recommendation, that about £30,000 should be expended in extending the plant, most of which will be required for new boilers, engines, dynamos, and electrical plant in the works. This will enable them to supply current to about 50,000 additional lamps. It is to-day announced that the Electric Lighting Committee have resolved to recommend that the charge for current be reduced from 6d. to 5d. per unit, and that £2 less be charged for the current supplied to each public lamp. This proceeds upon the expectation that there would be a gross profit of £8000 in the course of next year, if prices were to remain as at present; and the reductions will absorb £4820 of that. It is then added that, "according to the best tests, it is considered that the price proposed to be charged will be, light for light, equal to the Edinburgh gas." This makes the Edinburgh installation quite unique. No other corporation installation was ever known to secure a profit during the first year. To be sure, the profit has not yet been earned; it is only brought out by a process of counting eggs not hatched. The figures submitted by Professor Kennedy show that the Corporation contribute about one-third of the revenue for public lighting; and they are about to extend the public lighting installation. That is a large customer to begin with; but otherwise than in public lighting the Corporation are not very good customers to the Lighting Committee, because they have refused, on the ground of cost, to introduce electric lighting to the offices of the municipal departments. That is rather a commentary upon the statement that the cost will be, light for light, equal to that of Edinburgh gas. The proof of any such assertion will soon be had. Already, I hear, there is grumbling at lighting accounts having risen enormously. I learn that some have found the charge for electric lighting to be seven or eight times what they paid for gas; but, of course, we shall never be likely to hear of any such matter through the Electric Lighting Committee.

Lord Kingsburgh (the Lord Justice-Clerk of Scotland), who is a scientist of some standing, lectured to the Royal Scottish Society of Arts in Edinburgh on Monday, on the subject of "Electricity in the Home." Of course, he spoke most approvingly of the use of electric light. He made the extraordinary statement that had gas been in existence 300 years ago, not one of our Raphaels would have come down to us; and they must congratulate themselves that the day had arrived when there was some chance of their being preserved. As to cost, the highest that he went was to say that, taking into consideration the number of savings which could be effected in the use of electric light, he thought it would be found that the expense would not be seriously greater than that of gas. But it has to be remembered that the Lord Justice-Clerk would, according to his own showing, have us to live in houses which would be a maze of mechanical appliances for automatically turning the light on and off; and thus, supposing that the actual charge for light should not be much more than that for gas, there would be a heavy outlay upon engineering repairs, and servants would require to be skilled persons before they could profitably work all the little appliances which his Lordship described.

The Town Council of Brechin and the Gas Company are proceeding in an unusually frank manner to discuss the subject of the suggested transfer of the Company's undertaking to the Council. At the request of Provost Vallentine, the Secretary of the Company sent to him a copy of the last balance-sheet. Of course, the Provost wanted it for the purpose of picking holes in it, which work was deputed to the Treasurer, who proceeded to do it at a meeting of the Council on Wednesday. He had not, he said, had time to analyze the balance-sheet; but it was quite evident that it contained some very interesting facts. The nominal capital of the Company was £7000, of which, however, £300 had been withdrawn. They would have to recollect that somewhere about £2700 of that was capital which was merely in existence on paper, and not in money. This therefore showed, roughly, that the Gas Company had sunk £4000 of money. In addition, they had a reserve fund of £5871. The net profit last year was £361, which, on the nominal share capital, was equal to a rate of 5 per cent., but which, on the real capital, was equal to a rate of about 15 per cent. The works and properties of the Company were valued at £11,334. He suggested that it should be remitted to the Lighting Committee to consider, and report upon, whether the Council should acquire the undertaking, or come to an arrangement with the Company as to the gas supply. This was unanimously agreed to. There was a meeting of the Police Commissioners of Brechin the Monday night previous, at which the Treasurer (Mr. Aird) said that at a public meeting some weeks ago a resolution was adopted with acclamation, to the effect that the gas supply of the burgh ought to be tested in accordance with section 103 of the Police Act. The gas, until very recently, was far from satisfactory; and it was their duty to see that the supply in the burgh was of a proper standard. He moved that they make application to the Sheriff to have a gas-tester appointed. Dean of Guild Scott seconded. He suggested that the gas-testing appliance should be put in the police office or municipal buildings, so that any inhabitant could see that the gas was up to the standard; and he further proposed that the standard gas supply should be reported on along with the other municipal reports. Bailie Murray said that, before supporting such a motion, they should know the cost of the testing apparatus. This, he understood, would amount to between £80 and £100; and it would take a good many years before they could recoup the outlay. He moved that in the meantime they do not adopt the resolution. Councillor Moir seconded Bailie Murray's motion. On the suggestion of the Provost and Mr. Aird, both motions were withdrawn; and it was remitted to the Lighting Committee to investigate as to the cost and report. Just so; it is always better to look before you leap. The public meeting was quite delirious in its enmity to the Gas Company, and would have supported any proposal, however wild, which might have been made. But there is a limit even to frenzy; and the heads of the community, on sober reflection, have found that it may not be altogether profitable to go to very extreme measures against the Company, even though they may have before them the ulterior object of acquiring the undertaking on easy terms.

Mr. W. Ruxton, assistant to Mr. Carlow, the Manager of the Arbroath Corporation Gas-Works, has been appointed Manager of the Berwick and Tweedmouth Gas Company, in succession to Mr. A. B. Walker, who has gone to Walker and Wallsend. Mr. Ruxton is well known to gas managers in Scotland, as he has, since Mr. Carlow was appointed Secretary of the North British Association of Gas Managers, attended to the taking of subscriptions and the like at the meetings of the Association. This is another instance of the educated young man coming to the front. There were about 70 applicants for the post at Berwick, many of whom must have been men holding office, who wished a transfer; yet the post has gone to a candidate who is only 31 years of age, and who has had a distinguished student career. Mr. Ruxton was born in Glasgow, but has lived with his parents in Arbroath for eighteen years; during the last twelve of which he has been under Mr. Carlow at the gas-works. From Mr. Carlow, he received a sound training in all the departments of gas management; and at the same time, he attended science classes in the Dundee Technical Institute and the Dundee University College. He won several valuable prizes; and is the holder of South Kensington certificates. He deserves the greater credit in that his studies were prosecuted under the disadvantage of his requiring to attend to his daily duties in the works. Many will be glad to hear of his promotion, and will wish him success in his new and responsible position.

At a meeting of the Montrose Police Commissioners this week, it was reported that the Gas Company had declined to lay a new gas-main to Rossie Island in the meantime; and that, in consequence, the Commissioners could erect no more lamps on the Island. At the same meeting it was reported that, on a recent examination, it was found that out of 54 streets there were only eight in which there was no water passing in the mains at night. It was estimated that 60,000 gallons of water were being wasted every 24 hours. The Commissioners resolved to issue warning notices.

The stoppage of the gas supply in Broughty Ferry on Thursday of last week formed a subject of consideration at the Town Council on Monday. A Committee who had considered it, reported that they had heard the Manager (Mr. A. Waddell) and the foreman in explanation of the incident; and that the foreman took the whole blame for it on himself. He admitted his negligence in omitting to turn on the reserve gasholder when the other was nearly exhausted. There were, however, exceptional circumstances that day to be considered. On account of an alteration of some of the pipes, the retorts had been off from noon to 6 p.m.; and when the manufacture of gas was resumed, the Manager thought it desirable to pass the newly-made gas into the reserve holder. The foreman did not understand that this was being done, but thought the gas which was being made was passing into the ordinary holder in the usual way. Mr. Machan, the Convener of the Committee, was in the Manager's room at the time the gas went out; and he stated that Mr. Waddell at once conjectured the cause, and had the gas immediately turned on. There was sufficient gas to supply the town. He did not think the Manager could in any way be blamed for the occurrence. The Committee recommended that an automatic arrangement be adopted for turning on the gas from one holder before the other is exhausted; that the foreman be required to visit the holders once every hour, and record the contents of each holder at the time; that more light be thrown on the holders and valves; and that the Manager be instructed, when any of the retorts are laid off, to see that all the holders are full. These recommendations were adopted; and the Committee were instructed to have them put in force. They are rather too severe; I should say the periodic visitation of the holders would be sufficient. The last of the recommendations is out of the question, and will be impossible to keep. The first will be also almost useless.

Perhaps arising out of this incident, one of the Commissioners gave notice of a motion for next meeting, to the effect that they employ a gas engineer to report as to the quality of the gas and the general condition of the works. This is some new-fangled zeal, which should be repressed, as there is no necessity for any such inspection. The gas undertaking is in a thoroughly healthy condition.

Sir James Bell, Bart., the Lord Provost of Glasgow, has just prepared his third annual statement on the local municipal trusts and the progress of the city during his third year of office as the Chief Magistrate. One of the many subjects which he deals with is that of the supply of gas and electric light to the city, on which he makes the following remarks: The expenditure in the Gas Department on capital account during the past year was £53,630, and consisted principally of the balance of the cost of erecting new retort-houses and connections at Dawsholm, which had been in progress during the preceding two years, and of the cost of extending the gas-mains for the purpose of improving the supply. Five miles of new mains, 24 and 18 inches in diameter, were laid in different districts, at a cost of £13,000. An additional gasholder, capable of containing 5 million cubic feet, contracted for in March last, is now under construction at the Tradeston works. To meet the rapidly increasing demand, extensive additions will require to be made to the manufacturing plant; and in the opinion of the Manager (Mr. W. Foulis), the construction of an additional gas-works cannot be much longer delayed. The revenue last year showed an increase over that of the previous year to the extent of nearly £60,000, one-half of which arose from the additional consumption of gas; the augmentation being fully 267 million cubic feet, or 7·11 per cent. on the total quantity, and requiring for its production 29,352 tons of coal. The other moiety of the increase in revenue arose from the enhanced value of residuals, and was a matter for congratulation, as indicating an improved state of trade both within and beyond the city. The reduction in the price of gas which was made at the commencement of the current financial year, from 2s. 6d. to 2s. 4d. per 1000 cubic feet, brings the price to the lowest point it has touched in the history of the gas undertaking; and it is equivalent to a saving to the community of from £32,000 to £33,000 per annum. The market value of the gas annuity stock has risen since last year to the extent of £77,000, which is practically an increase of the liabilities of the department, and is a sum greater than the reduction of capital during the year by the amounts set apart from ordinary revenue to meet depreciation and sinking fund. While there is a limit to this appreciation of stock, it yet emphasizes the inadequacy of the amount required by statute to be set aside towards the repayment of capital expenditure, and raises the question whether the fixed statutory rate should not be increased, and the reduction of debt no longer left subject to the fluctuating circumstances of the department, or to the ideas of expediency which may obtain from time to time. The additional capital expenditure during the year in the Electric Light Department was £20,524. To meet the increased demand, two new Babcock and Wilcox boilers, two 300-horse power Willans engines, and two dynamos, each equal to 3000 lamps of 8-candle power, have been brought into operation; while the extension of the mains to the West-end Park district has been completed. The aggregate number of consumers has increased from 488 to 725; and the number of 8-candle power lamps wired, from 59,543 to 68,550.

I understand that an action for £500, as damages for alleged slander, has been brought by a workman who was recently dismissed from the Forfar Corporation Gas-Works, against the Convener of the Works Committee.

The list of places where Hislop's patent regenerative system has been adopted, which I gave last week, was not quite complete. The Inverness Town Council have resolved to introduce it to a bench of 32 retorts.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 14.

Sulphate of Ammonia.—There is rather a steadier feeling; and a fair amount of business has been concluded, at prices last recorded, so that no further shrinkage in values has taken place during the week just passed. Makers are adapting themselves to the present order of things; and when the holdings are somewhat lightened, a better state of affairs may reasonably be counted upon. Very low quotations are still disseminated abroad for delivery over the spring months at the equivalent of about £8 15s. to £8 17s. 6d. f.o.b. at the ports; but any marked demand from consumers would immediately dispel these tactics. Prompt parcels are quoted at £8 11s. 3d. to £8 12s. 6d. Leith and Hull, and £8 15s. f.o.b. Liverpool.

Nitrate of Soda has a better tone, with a slight advance in prices; quotation on spot being 7s. 7½d. to 7s. 9d. per cwt.

LONDON, *Dec.* 14.

Tar Products.—Benzols continue steady, and in fair demand at the improved prices mentioned previously. In sympathy with this upward movement, toluol, solvent naphtha, as well as crude naphtha, are all quoted at higher prices. Creosote and common tar oils, with the single exception of heavy oil for grease purposes, are dull and unsaleable. Important business is reported in creosote salts, which is welcomed by distillers, as it in some measure relieves their large stocks of creosote. There is some inquiry for prepared and refined tar for foreign consumption. Anthracene continues in good request; and the Committee controlling this article have no difficulty in maintaining the prices quoted. Some outside lots of anthracene, however, are reported to have been sold at quite 1d. below the Committee's prices. A little more is doing in carbolic acid and its products; but no marked improvement in value is recorded. The following prices have been current

during the past week: Tar, 18s. 6d. to 24s. Pitch, nominal, 33s. 6d. west coast; 36s. east coast. Benzols, 90's, 2s. 4d.; 50's, 2s. 1d. Solvent naphtha, 1s. 4d. Toluol, 2s. Crude, 30 per cent., naphtha, 9½d. Creosote, nominal, 1d. Naphthalene, pressed, 45s.; drained, 27s. 6d. Cresylic acid, 1s.; crude, 9d. Carbolic acid, 60's, 1s. 8d.; 75's, 1s. 11d. Anthracene, "A," 11d. to 1s.; "B," 9d. to 10½d. All prices subject to usual discount.

Sulphate of Ammonia keeps flat; makers holding off for higher prices. Considerable stocks are reported to be held by large makers. The quantities, however, have been much magnified, by interested dealers, as, in one case at least, where large stocks are held, the producer has important contracts waiting shipment, which will more than take up the stock. Except Beckton, which is quoted £9, this week's value has been £8 12s. 6d., less 3½ per cent. at all ports. Gas liquor is quoted at 7s. to 8s.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Only a limited business is stirring in the coal trade here, notwithstanding the advent of winter; and pits in many cases continue on short time. The demand for house coals is much below the average for this season of the year; and prices are not more than steady at about late rates, with no indications of any upward movement. Common round coals, suitable for iron-making, steam, and general manufacturing purposes, continue very bad to sell; and to move away surplus quantities, lower prices than ever have in some instances been taken. At the pit mouth, round coals remain at about 10s. to 10s. 6d. per ton for best Wigan Arley, with only a very limited business at the maximum figure; 8s. 6d. to 9s., for second qualities of Arley and Pemberton four-feet; and 7s. to 7s. 6d., for common house-fire coals. For ordinary inland sales, 6s. to 6s. 6d. per ton at the pit are the full average figures for good qualities of steam and forge coal, with 1s. less taken in some cases for shipping orders. Increased supplies of engine fuel are now offering in the market; some collieries having to stock a good deal of their present output. Common sorts are offering at very low figures, especially from outside districts, and are obtainable at from 2s. 6d. up to 3s. 6d. per ton at the pit; but the better qualities are fairly steady at 4s. 6d. to 5s. per ton. Extreme depression continues the general report as regards the shipping trade; and business is only practicable at excessively low figures. The prices at which orders for common steam coals could in some instances be placed are, if anything, less than those ruling recently; these qualities being obtainable at as low as 6s. 9d. to 7s. per ton, with better descriptions quoted at 7s. 6d. to 7s. 9d., delivered at the ports on the Mersey.

Northern Coal Trade.—A rather better demand has been experienced for coal generally this week; but the stormy weather has made the arrivals of steamers rather irregular, and hence collieries have in some instances been idle from this cause—steam coal collieries suffering the most. Best Northumbrian steam coal is still quoted at 8s. per ton f.o.b.; but the pits do not find much more than work for three-quarter time. Second-class steam coals are 7s. 6d. per ton; and steam small coals, 3s. 9d. to 4s. Manufacturing coals are generally quiet. The chief contracts for locomotive coal for next year have now been concluded. They are for the supply of the North-Eastern Railway; and on the average the price will be 7s. 6d. per ton, free on the Company's line, which is about 6d. per ton below the present contracts. In the household coal trade there is less alteration; the demand being steady, and prices unchanged at about 10s. to 11s. per ton f.o.b. for shipment. Gas coal collieries are working well; and in some instances the whole production is taken up by contracts for two or three months ahead. For odd cargoes, the price varies from 6s. 6d. to 7s. 3d. per ton f.o.b. Coke is very steady in price; the usual decrease in the exports at this season being met by the enlarged quantity sent to the north-west, where additional blast furnaces are being put into operation.

Scotch Coal Trade.—Trade is still unsatisfactory; and as the engineering dispute seems to be entering upon a new lease of life, while the holidays will be on in little more than a week, no improvement need be looked for. The prices quoted are: Main, 5s. 10d. per ton f.o.b. Glasgow; ell, 6s. 9d. to 7s.; splint, 6s. 6d. to 6s. 9d.; and steam, 7s. 6d. to 7s. 9d. The shipments for the past week amounted to 144,175 tons—a decrease on the preceding week of 21,393 tons, and compared with the corresponding week of last year of 6861 tons. For the year to date, the total shipments have amounted to 7,051,014 tons—an increase over the same period of last year of 2,079,193 tons, but a decrease as compared with 1893 of 395,642 tons.

Prepayment Meters at Dukinfield.—Mr. Harrison Veevers, the Gas Engineer, has reported to the Dukinfield District Council that the number of prepayment meters in use on the 2nd inst. was 341, of which 201 were new consumers; and that he estimates each of these will take 7000 cubic feet yearly, or a total of about 1,500,000 feet, giving a gross profit of £750. Since the 2nd inst. there have been eleven more fixed, of which ten are new consumers.

Gas Consumption at Halifax.—During the week ending on the 5th inst., a "record" in the matter of gas consumption was made at Halifax—at any rate, for November and December. During the week ending Nov. 21, the consumption was 20,542,000 cubic feet; whereas in the same period last year, the total was rather over 2 million feet beneath these figures. The output rose to 21,288,000 feet in the succeeding week; and the gain was about the same. In the week ending the 5th inst., however, the consumption rose to 21,690,000 cubic feet, or 1,251,000 feet in advance of the corresponding week a year ago. Together, the figures of this year's consumption, in the three weeks named, give a total of 63,525,000 feet, against 58,904,000 feet last year; being an increase of 4,621,000 feet, or 7¾ per cent. The greatest quantity of gas ever sent out to consumers in seven days was during the week ending Jan. 17 this year, when the total was 22,188,000 feet. The Corporation Gas Engineer (Mr. T. Holgate) estimates that Halifax will this year have increased its consumption of gas by close upon 50 million cubic feet.

The Water Supply of Halton.—A Local Government Board inquiry was held at Halton last Tuesday, into an application by the Lunesdale District Council for power to borrow £1200 for the purpose of providing a water supply for Halton. The Engineer of the scheme is Mr. W. Harrison, of Preston; and he explained to the Inspector (Colonel A. G. Durnford) that an arrangement had been entered into to take a supply from the Thirlmere aqueduct. A connection would be made at a point about a mile north of the place where the aqueduct crossed the Lune. The pipes were to be 3-inch cast iron, socketed with lead jointing. A receiving tank was to be constructed at 460 feet above sea-level; and the lowest point at Halton was 40 feet above sea-level. It was stated by Mr. Blackstock, of the Manchester Corporation Water Department, that the charge stipulated was to be 8d. per 1000 gallons, subject to the Council fixing a price when the contract was finished. It would probably be from 8d. to 9d. A large amount of evidence was given by opponents who favoured a scheme for obtaining a supply from the Caton Water-Works.

The Dover Gas-Works Reading and Recreation Room.—The eighth anniversary of the opening of this room was celebrated last Tuesday, the Chairman and Directors of the Dover Gas Company being present. The room was tastefully decorated. The principal part of the entertainment consisted of a lecture entitled "A Holiday Trip to Scotland," given by Mr. W. Mannering, the Chairman of the Company, and illustrated with lantern views kindly exhibited by Mr. E. Mannering. The audience followed the description with much interest; the views lending reality to the narrative. A hearty vote of thanks was accorded. After the lecture, there was a smoking concert, at which refreshments were provided by Mr. W. Mannering; and not only were those present at the entertainment thought of, but also the men on duty. At the conclusion of the concert, cordial votes of thanks were passed to Mr. R. Herring, the Company's Engineer (the President of the room), the Honorary Secretary, and the Entertainment Committee. It may be added that the Chairman and Directors take great interest in the reading and recreation room, and have contributed liberally to the library fund.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 1239.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	10	22⅛–23½	–½	4 9 5
100,000	10	,,	7½	Do. 7 p. c.	10	16½–17½	..	4 5 8
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	107–109	..	4 11 9
200,000	5	14 Nov.	6¼	Bombay, Limited	5	6¼–7¼	..	4 9 8
40,000	5	,,	6¼	Do. New	4	5–5⅛	..	4 14 7
380,000	Stck.	14 Aug.	12	Brentford Consolidated	100	267–272	+10	4 8 3
180,000	,,	,,	9	Do. New	100	207–212	+2	4 4 11
220,000	Stck.	27 Sept.	11	Brighton & Hove Original	100	227–232	..	4 14 10
933,500	Stck.	29 Aug.	5	Bristol	100	124–128	..	3 18 1
320,000	20	27 Sept.	11¼	British	20	549–55⅛	..	4 1 1
50,000	10	29 Aug.	11¼	Bromley, Ordinary 10 p. c.	10	22⅜–23¼	..	4 17 10
51,510	10	,,	8¾	Do. 7 p. c.	10	18½–19¼	–¼	4 7 2
328,750	10	14 Nov.	4	Buenos Ayres (New) Limited	10	7¾–8¼	..	4 17 1
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	102–104	..	5 15 5
150,000	20	11 July	8¼	Cagliari, Limited	20	30–32	..	5 3 3
550,000	Stck.	26 Oct.	13¾	Commercial, Old Stock	100	322–327	..	4 2 7
165,000	,,	,,	10¾	Do. New do.	100	250–254	+2¼	4 2 8
160,762	,,	12 June	4½	Do. 4½ p. c. Deb. do.	100	143–147	..	3 1 3
800,000	Stck.	12 June	13	Continental Union, Limited	100	277–282	..	4 12 2
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	215–220	..	4 11 10
535,000	Stck.	29 Aug.	5¼	Crystal Palace Ord. 5 p. c. Stk	100	127–132	..	3 19 6
486,090	10	26 July	11	European, Limited	10	25¾–26¾	..	4 3 0
351,060	10	,,	11	Do. Partly paid	10	17–18	..	4 14 3
5,646,590	Stck.	14 Aug.	12½	Gaslight & Coke, A, Ordinary	100	293–298	..	4 5 6
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	107–112	..	3 11 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	287–292	+2	3 8 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	135–140	..	3 11 5
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	200–205	..	3 13 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	193–198	..	3 10 9
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	282–287	..	3 9 8
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	168–172	+1½	3 9 9
1,061,150	,,	12 June	4	Do. 4 p. c. Deb. Stk.	100	137–142	..	2 16 4
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	147–152	..	2 19 2
908,000	,,	,,	6	Do. 6 p. c. do.	100	202–207	..	2 17 11
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	235–240	..	5 0 0
75,000	5	26 June	6	Malta & Mediterranean, Ltd	5	0–6½	..	4 12 4
560,000	100	1 Oct.	5	Met.of Melbourne, 5 p.c. Deb	100	113–116	..	4 6 2
541,920	20	14 Nov.	5	Monte Video, Limited	20	16½–17⅜	..	5 14 3
150,000	5	28 Nov.	8	Oriental, Limited	5	7¾–8¼*	..	4 16 11
60,000	5	12 Sept.	7	Ottoman, Limited	5	5–5⅜	..	6 7 3
166,870	10	14 Feb	2	Para, Limited	10	1¼–1¾	–⅛	11 8 6
				People's Gas of Chicago—				
420,000	100	2 Nov.	6	1st Mtg. Bds.	100	105–110	..	5 9 1
500,000	100	9 Dec.	6	2nd Do.	100	100–105*	+1	5 14 3
150,000	10	16 Oct.	7	San Paulo, Limited	10	11¼–12⅜	..	5 12 0
500,000	Stck.	29 Aug.	15½	South Metropolitan, A Stock	100	375–380	+5	4 1 7
1,350,000	,,	,,	12	Do. B do.	100	308–313	..	3 16 8
308,685	,,	,,	13	Do. C do.	100	325–330	..	3 18 9
800,000	,,	11 July	5	Do. 5 p. c. Deb. Stk.	100	175–178	..	2 16 2
60,000	Stck.	12 Sept.	11½	Tottenham & Edm'nton, "A"	100	230–235	..	4 17 10
				WATER COMPANIES.				
746,021	Stck.	26 June	10¾†	Chelsea, Ordinary	100	297–302	..	3 7 10
1,719,514	Stck.	16 Oct.	7	East London, Ordinary	100	215–220	..	3 3 7
654,740	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	157–162	..	2 15 6
700,000	50	26 June	6¼†	Grand Junction	50	112–116	+1⅛	2 16 0
708,000	Stck.	29 Aug.	12	Kent	100	310–315	..	3 16 2
1,043,800	100	26 June	7¼†	Lambeth, 10 p. c. max.	100	247–252	..	2 17 8
406,200	100	,,	7¼†	Do. 7½ p. c. max.	100	210–215	..	3 7 6
330,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	100	143–148	..	2 14 2
500,000	100	14 Aug.	12⅜	New River, New Shares	100	380–390	..	3 3 7
1,000,000	Stck.	26 July	4	Do. 4 p. c. Deb. Stk.	100	143–148	..	2 14 2
902,300	Stck.	12 June	6†	S'thwk & V'xhall, 10 p.c. max.	100	152–157	+7	3 16 5
126,500	100	,,	6†	Do. D 7½ p.c. do.	100	140–145	..	4 2 9
1,155,066	Stck.	12 June	10	West Middlesex	100	293–298	..	3 7

*Ex div.

† Next dividend will be at this rate.

The Proposed New Reservoirs for Wakefield.—The Wakefield City Council last Tuesday rescinded a resolution, passed on Oct. 22, authorizing the Water Committee to take steps to carry out the construction of two additional reservoirs (see *ante*, p. 936). Party feeling runs high in the Council; and since the original resolution was passed, the then Liberal majority has been displaced by a Conservative one.

The Wells Town Council and the Gas-Works.—At a special meeting of the Wells Town Council held last Tuesday, the offer of the Council of £14,000 for the whole property of the Gas Company, including the £2300 of mortgage debentures, was declined by the Directors, in a letter read from the Secretary and Manager (Mr. C. V. Bennett). They, however, said they would be prepared to recommend the shareholders to accept £15,000. Mr. Crosse proposed that £14,700 be offered; and this was agreed to.

Sales of Shares.—Mr. Alfred Richards recently sold at the Mart, Tokenhouse Yard, E.C., £5820 of "D" gas stock of the *Barnet District Gas and Water Company*. This class of stock is entitled to a maximum dividend of 7 per cent.; and the last dividend paid thereon was £6 6s. per cent. per annum. The £100 lots of the stock fetched from £152 10s. up to £162; while the last lot (£120) was knocked down at £188 8s. The total amount realized by the sale was £9153 8s.—— A parcel of 500 £10 new ordinary shares in the *North Middlesex Gas Company* lately changed hands for £7929.

Portsmouth Water-Works Purchase Question.—The latest information received regarding this matter is that the price asked by the Directors of the Portsmouth Water Company is £1,030,000, some £14,000 of which is for compensation to the Directors, Secretary, Treasurer, and other officials of the Company. The Special Water Committee of the Corporation are trying to get a reduction of the amount of the last-named figure; and it is also understood that they are unanimous in their determination that they will have nothing to do with the purchase of the works, unless they can borrow the money for a term of 80 years, with five years' suspension of the sinking fund. The whole of the negotiations are, of course, subject to the examination of the works by an expert, and his favourable report thereon.

Incandescent Gas v. Electric Lighting at Dover.—At the meeting of the Dover Town Council last Tuesday, the minutes submitted by the Gas Committee contained particulars as to the new contract entered into with the Gas Company for the public lighting of the town, under which incandescent burners are to be fitted to the street-lamps. The Town Clerk stated on the occasion that the total cost of gas lighting on the old lines for the past year had been £3300, whereas under the new contract it would be £3170—a saving of £130. The Company are reaping the reward of their enterprise in putting up some time ago a number of incandescent burners at their own expense; for they are evidently preferred to the electric light, which is in use in only a few of the public lamps. This fact has doubtless spurred on the Electric Light Company to bring down their price from 8d. to 5d. per unit. In the meantime, the Gas Company have the satisfaction of witnessing an increased consumption of gas in the town.

The Manchester Gas Committee and Sulphate of Ammonia Manufacture.—On the request of the Chairman of the Manchester Corporation Gas Committee (Mr. Alderman Gibson), Mr. G. Ernest Stevenson, the Engineer of the Rochdale Road station, has prepared a report on the question of the proposed conversion of the ammoniacal liquor produced at the works into sulphate of ammonia. In order that his report might be as complete as possible, Mr. Stevenson visited several works, and obtained information as to various forms of still and methods of working. As the result of his inquiries, he advises the adoption of plant similar to that in use at Beckton, as being the most powerful, completely automatic, and involving a comparatively small expenditure of labour. He estimates that a plant of sufficient capacity could be put up for a sum not exceeding £20,000. It is suggested that the plant should be erected at the Bradford Road gas station, to which place the liquor could be conveyed from Rochdale Road station by pumping through pipes, and from the Gaythorn works in the same way or by barges. Mr. Stevenson estimates that, manufacturing the ammoniacal liquor in the way suggested, there would be a margin of profit over and above the amount realized for liquor under the present contract of 22s. 2d. per ton of sulphate, which, at 4000 tons a year, amounts to £4433 6s. 8d. in the year. The Committee are urged not to entertain the idea of a partial or experimental plant. Sulphate manufacture, the report says, is not an experiment; it is a matter of long practical experience. The plant is now as perfect as it is likely to become; and the results are well known and guaranteed. The plant is also so compact and so powerful in proportion to its dimensions, that apparatus suitable for a large production costs little more than apparatus for a small production; but if a small plant were put up and afterwards added to, the first cost would be greater, and the working expenses permanently increased. Mr. Stevenson is certain that the enterprise would be a great success.

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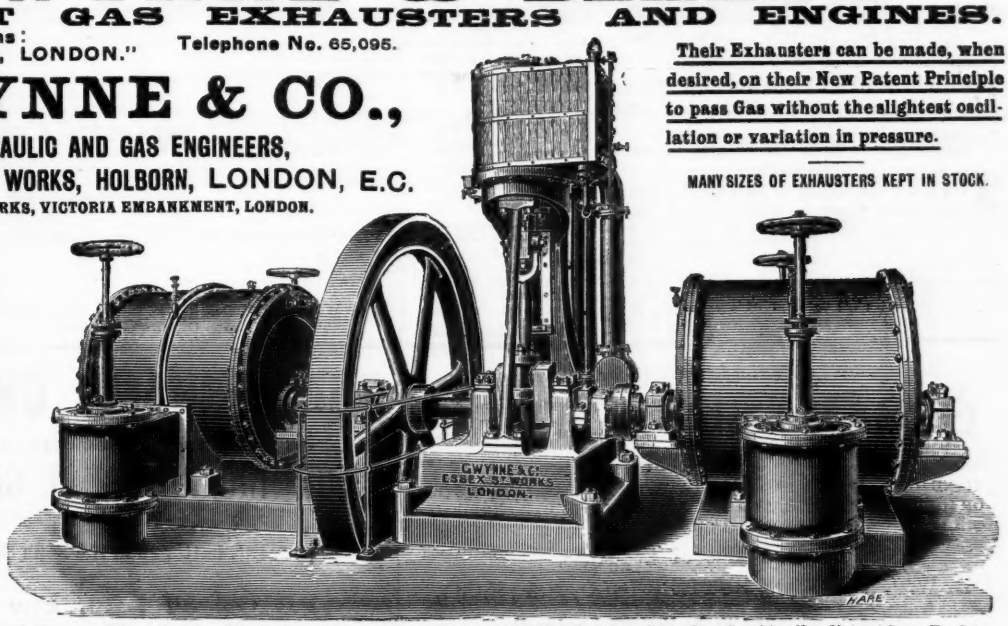

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HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY will SUPPLY on APPROVAL 40-gallon Barrels "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Solid and Liquid Lubricants for all other purposes.
RELIANCE LUBRICATING OIL COMPANY, 19 & 21, WATER LANE, GREAT TOWER STREET, LONDON, E.C.

WANTED, a Young Man as Gas-Fitter and MAIN and SERVICE LAYER.
Apply, stating Age and Wages required, to B. GIBSON, Manager, Gas-Works, HAVERHILL.

WANTED, a Draughtsman experienced in Gas Apparatus at Engineering Works in Lancashire.
Apply, with References, stating Age and Salary, to No. 2605, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LOUGHBOROUGH GAS COMPANY.

WANTED, a Foreman. Must be a good Carbonizer, able to lay Mains and Services and must understand the working of Exhausters, and the other Apparatus on the Works.
State Age and Experience, and send one or two Testimonials.
Wages, 33s. per week, with House, Coal, and Gas.
Apply, at once, to
J. B. BALL,
Engineer and Manager.
Gas-Works, Loughborough.

CORPORATION OF STALYBRIDGE.

WANTED, a Gas Manager for the Stalybridge Gas-Works. Annual production of Gas, 140 million cubic feet.
Written Applications, stating Age, Experience, and Salary required, to be sent in not later than the 24th of December next, addressed to the Chairman of the Gas Committee, Town Hall, Stalybridge, and endorsed "Application for Gas Manager."
Canvassing members of the Council will be a disqualification.
JNO. MILLER,
Town Clerk.
Town Hall, Stalybridge,
Dec. 12, 1895.

Now Ready, Handsome Cloth, 9s. Post free,

GAS MANUFACTURE
(THE CHEMISTRY OF);

HANDBOOK ON THE PRODUCTION, PURIFICATION, AND TESTING OF ILLUMINATING GAS, AND THE ASSAY OF THE BYE-PRODUCTS OF GAS MANUFACTURE.

For the Use of Students.

By W. J. ATKINSON BUTTERFIELD, M.A., F.C.S.,

Head Chemist, Gas-Works, Beckton, London, E.

WITH NUMEROUS ILLUSTRATIONS.

*** This work deals with the MOST MODERN DEVELOPMENTS of the subject; and the chapter treating of the BYE-PRODUCTS will be found of special interest.

London: CHARLES GRIFFIN & Co., Ltd., Exeter Street, Strand.

GOLD BRAND CHIMNEYS,
Proved the best Chimneys in the Market

FOR INCANDESCENT GAS-LIGHT.

According to Trials in Street Lighting,

40 per cent. better than the Zena Schott Chimneys.

PRICE 37s. 6d. Per Hundred.

Special Terms for Large Contracts.

Sample dozens at 6s. sent post free.

GEORGE HOPP,
Sole Agent for the U.K.,
17, SOUTH CASTLE STREET, LIVERPOOL.

District Agent Wanted in all places of the U.K.

LYON'S (J. H.) COMBINATION SYPHON AND TEST BOXES.

UNSOLICITED TESTIMONY.

Gas-Works, Tuam, Nov. 20, 1895.

Mr. J. H. LYON, Malvern Link.

Dear Sir,—You will, I know, be glad to hear that the "Combination Syphon and Test Boxes" which you supplied to us two years since have given **complete satisfaction.** The small extra cost over the ordinary syphon is more than compensated for by the ease with which main testing or repairs can be carried out; and also in case of **fire**—such, for instance, as the great blaze at Tuam in June last. Five minutes after receiving word, gas was cut off the burning premises by filling one of your Boxes—thanks to your ingenious invention.

Yours truly, T. M. WALSH.

For Price and Particulars, apply to

J. H. LYON, Consulting Gas-Works Manager, Malvern Link.

WANTED, Vol. I., or complete Set (three Vols.), of "KING'S TREATISE ON GAS MANUFACTURE."
Address No. 2606, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FOR SALE, Cheap—A Small GAS-HOLDER, 40 feet diameter, by 12 feet deep. In good condition.
Apply to the Manager, Gas-Works, Sandown, I. of W.

FOR SALE.—A 300-Light Dry Gas-Meter, with Flange Connections, made by the Gas-Meter Company. Equal to new.
Full Particulars and Price may be had on application to R. S. Church, Engineer, Gas-Works, Chichester.

FOR SALE—The Oxygen Plant recently erected for Purification Purposes at the Stoke-on-Trent Corporation Gas-Works, by Brin's Oxygen Company, Limited.
It may be inspected on application to the Manager, Mr. W. Prince.
No reasonable offer will be refused.

FOR SALE—A complete Gas Plant, equal to about 6 Millions per annum (the Proprietors having no further use for same), comprising—
One Single-Lift HOLDER, 40,000 Feet.
One SCRUBBER, 20 ft. by 3 ft. 6 in.
Four PURIFIERS, 8 feet square, CENTRE-VALVE, &c.
One GAS-ENGINE and EXHAUSTER.
One GOVERNOR, 6-inch Connections.
One do. 4-inch do.
Sixteen ∩ MOUTHPIECES, PIPES, HYDRAULIC MAINS in Four Sections, VALVES, &c.
The above will be out of action in a few days.
Apply to
Philip Thomas,
Engineer.
Gas-Works, Wellington,
Somerset, Dec. 5, 1895.

FOR SALE—All the Gas Plant at East Bridge Street, Falkirk, comprising—
HYDRAULIC MAIN, 50 ft. by 14 in. by 14 in. ∩ shape, in Six Sections.
Twenty ∩ MOUTHPIECES, 24 in. by 14 in., with Doors and Screws, 6-inch ASCENSION-PIPES and BRIDGE PIPES.
One set of Annular CONDENSERS, 6-inch Connections.
Four PURIFIERS, 12 ft. by 8 ft. by 4 ft. 6 in., with Hydraulic Valves and Lifting-Crane. CORRUGATED IRON ROOF over Purifiers, with Six Cast-Iron Columns.
One STATION METER, by Milne, 4-inch Connections.
Three GASHOLDERS—One 40,000 Cubic Feet, in Cast-Iron Tank, with Six Columns and Counterbalance Weights; one 14,000 Cubic Feet, with Four Columns; and one Telescope Holder, 9000 Cubic Feet, Four Columns and Counterbalance Weights.
The Plant may be inspected on application to the Manager, P. B. Watson.
Offers will be received for the whole or any part of the Plant, as offerers see fit.
The Commissioners do not bind themselves to accept the highest or any offer.
Offers to be lodged with
James Wilson,
Town Clerk.
Burgh Buildings, Falkirk,
Dec. 13, 1895.

COWES GASLIGHT AND COKE COMPANY.

TENDERS are invited for the supply and delivery of about 80 Tons of SOCKET and SPIGOT GAS-MAINS, with Sundry Connections.
For Specifications, &c., apply to
A. Thomas.
Cowes.

THE Gas Committee of the Todmorden Urban District Council are prepared to receive TENDERS and DESIGNS for the complete erection of RETORT-STACK on the Inclined Principle, including all Fittings, Machinery, &c.
Specification and Particulars may be had on application to the undersigned.
Sealed tenders, endorsed "Tender for Retort-Stack, &c.," to be sent in addressed to the Chairman of the Gas Committee, Town Hall, Todmorden, not later than Twelve Noon on Friday, the 20th of December, 1895.
By order,
George E. Saville,
Engineer and Manager.
Gas-Works, Todmorden,
Nov. 28, 1895.

SHEFFIELD UNITED GASLIGHT COMPANY.

NEEPSEND STATION.
No. 2 RETORT-HOUSE.
TO STEEL PIPE MANUFACTURERS.

THE Directors of this Company invite TENDERS for the Manufacture and Delivery (without erection) of a circular STEEL FOUL-GAS MAIN, consisting of about 870 feet 30 inches diameter, 170 feet 24 inches diameter, and 160 feet 18 inches diameter, with all necessary Bends, Tees, and Specials.
Copies of the Drawings, with Specification and Form of Tender, may be obtained upon application to the Engineer, Mr. Fletcher W. Stevenson, upon payment of 10s. 6d. (not returnable).
Sealed tenders, endorsed "Tender for Foul-Gas Main," to be delivered by post to the undersigned, at the Company's Offices, on or before Saturday, Jan. 4, 1896.
The Directors do not bind themselves to accept the lowest or any tender.
Hanbury Thomas,
General Manager.
Commercial Street, Sheffield,
Dec. 12, 1895.

THE Directors of the Paignton Gas Company invite TENDERS for the purchase of the AMMONIACAL LIQUOR produced at their Works.
Quantity about 70,000 Gallons.
Contractor to provide Tank, and accept delivery Free on Rail at Paignton Station, G.W.R.
Tenders to be sent to the undersigned no later than Dec. 28, 1895.
Thornton White,
Manager.

THE Directors of the Worksop Gas Company invite TENDERS for the purchase of the surplus TAR and the AMMONIACAL LIQUOR made at their Works from the 1st of January, to the 31st of December, 1896.
Tenders for Tar to state price per ton delivered into Purchaser's Tanks at the Worksop Railway Station.
Tenders for Liquor to state price per ton, as tested by No. 1 Twaddel's Hydrometer, delivered into Boats near Company's Works, or price per ton delivered into Purchaser's Tanks at the Railway Station.
The Directors do not bind themselves to accept the highest or any tender.
Tenders to be sent in by the 28th inst.
Worksop, Dec. 6, 1895.

GLASGOW CORPORATION.
(Gas and Electric Lighting Department.)
TENDERS FOR STATION METER.

THE Committee on Gas Supply and Electric Lighting of the Glasgow Corporation are prepared to receive TENDERS for a STATION METER to be erected at their Tradeston Gas-Works.
Plans and Specifications can be seen and Form of Tender obtained at the Engineer's Office, 45, John Street, Glasgow.
Sealed offers, marked "Tender for Station Meter," to be addressed to the Subscriber, and lodged with him on or before Tuesday, the 24th curt.
The Committee do not bind themselves to accept the lowest or any tender.
J. D. Marwick,
Town Clerk.
Glasgow, Dec. 12, 1895.

THE URBAN DISTRICT COUNCIL OF ENFIELD.
TO PUMP MAKERS AND WELL SINKERS.

THE Urban District Council of Enfield are prepared to receive TENDERS for the EXTENSION and LOWERING of Two 13-inch Open-topped PUMPS, the OVERHAULING of certain GEAR, and other Works.
A Drawing of the work may be seen, and copies of the Specification obtained, at the Office of the Engineers, Messrs. John Taylor, Sons, and Santo Crimp, 27, Great George Street, Westminster, on payment of One Guinea, which will be returned upon receipt of a *bond-fide* tender.
Sealed tenders, endorsed "Tender for Pump Lowering," to be sent in to me not later than Noon on Wednesday, the 1st day of January, 1896.
By order,
T. W. Scott,
Clerk.
Court House, Enfield,
Dec. 11, 1895.

MANCHESTER CORPORATION GAS-WORKS.
CARBURETTED WATER-GAS INSTALLATION.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the various WORKS and PLANT required in connection with the CARBURETTED WATER-GAS INSTALLATION at their Bradford Road Gas Station as under, viz.—
Contract No. 4.—For the construction of a SINGLE-LIFT GASHOLDER, 80 feet diameter and 24 feet deep, with twelve Cast-Iron Standards, 25 feet high, with one tier of Steel Girders at top. The work to include the supply of Holding-Down Bolts and Plates; also the Tank Guides.
Contract No. 5.—For a CAST-IRON WATER and TAR TANK, in three divisions, the whole about 110 ft. by 34 ft. 6 in., and 4 ft. 6 in. deep, with the necessary Steel Supporting Girders and Rolled Joists. This Tank will be carried upon Brick Walls, and will form the Roof of a portion of the Buildings to be erected for the Carburetted Water-Gas Plant.
Drawings may be seen, and General Conditions of Contract, Specifications, and Bills of Quantities obtained, on application (in writing only) to Mr. C. Nickson, Superintendent of the Gas Department, Town Hall. A deposit of One Guinea (which will be returned on receipt of a *bond-fide* tender) must accompany the application for a Form of Tender in respect of each contract.
Sealed tenders, endorsed as above, and addressed to the Chairman of the Gas Committee, must be delivered at the Gas Offices, Town Hall, not later than Ten a.m. on Wednesday, the 8th of January next.
The Corporation do not bind themselves to accept the lowest or any tender.
By order of the Gas Committee,
Wm. Henry Talbot,
Town Clerk.
Town Hall, Manchester,
Dec. 13, 1895.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as the DEBENTURE STOCK only is concerned, WILL BE CLOSED on and from the 23rd of December, 1895, until the 4th of January, 1896, both days inclusive.
By order,
Chas. W. Braine,
Secretary.
Offices: North Street,
Wandsworth, S.W., Dec. 12, 1895.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS so far as they relate to DEBENTURE STOCK only WILL BE CLOSED on the 24th inst., and RE-OPENED on the 1st prox.
S. J. Williams,
Secretary.
63, Chancery Lane, W.C.,
Dec. 16, 1895.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company so far as they relate to the DEBENTURE STOCK WILL BE CLOSED at Ten o'clock forenoon on Friday, the 13th inst., and RE-OPENED on Friday, the 27th inst.
The Interest for the Half Year to the 31st of December, 1895, will be payable on the 1st day of January next, to the Proprietors on the closing of the Books.
By order of the Board of Directors,
James Randall,
Secretary.
Gas Offices: Willoughby Lane,
Tottenham, Dec. 6, 1895.

THE GASLIGHT AND COKE COMPANY.

SALE, BY TENDER, OF £100,000 ORDINARY "A" CONSOLIDATED STOCK.
Minimum Price, £292 per cent.

THE Directors of The Gaslight and Coke Company will be prepared to receive, not later than Twelve o'clock (noon) on Thursday, the 19th of December inst., TENDERS for £100,000 of new ORDINARY "A" CONSOLIDATED STOCK, such Stock to be paid up in full on or before the 1st of January, 1896, from which date the Dividend thereon will commence to accrue.
Any amount, being not less than £5 or a multiple thereof, may be tendered for; and the Stock will be registered in the Company's Books free of expense.
The Minimum Price has been fixed at the rate of £292 per £100 of Stock.
Forms of Tender, with full Particulars and Conditions, may be obtained on application at this Office.
By order,
John William Field,
Secretary and General Manager.
Chief Office: Horseferry Road,
Westminster, S.W., Dec. 2, 1895.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £20,000 FIVE PER CENT PERPETUAL DEBENTURE STOCK.
Minimum Price, £172½ per cent.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £20,000 of Five per Cent. PERPETUAL DEBENTURE STOCK, in accordance with the Provisions of the South Metropolitan Gas Act, 1882.
Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and tenders must be sent in on or before Wednesday, the 1st day of January, 1896.
The Stock will be allotted to the highest bidders; but no tender will be accepted at a lower price than at the rate of £172½ money for each £100 Debenture Stock.
By order,
Frank Bush,
Secretary.
Offices: 709A, Old Kent Road, S.E.,
Dec. 7, 1895.

PERIODICAL SALES of Stocks, Shares and Debentures in Gas Companies, Tramway Companies, and other Commercial Undertakings, are held by
J. A. & W. THARP,
at the Mart, Tokenhouse Yard, every month.
For Terms, apply to the Auction Offices, 9, Norton Folgate, Bishopsgate St., E. Telephone No. 11,342.

SALE OF SHARES.

J. A. & W. THARP will Sell by Auction, at the Mart, E.C., on Thursday, Dec. 19, at Two o'clock, SHARES in the following well-established Companies—
The Lea Bridge, Leyton, and Walthamstow Tramways Company.
The Patent Victoria Stone Company, Limited.
The Commercial Gas Company.
The West Ham Gas Company.
The London Street Tramways Company.
The London Road-Car Company.
The National Safe Deposit Company.
The Continental Metropolitan Tramways Company, Limited.
Particulars of the Auctioneers, 9, Norton Folgate, Bishopsgate Street, E. Telephone No. 11,342.

HUNTER'S
OXIDE OF IRON.
James Hunter, Miner, and Shipper of
NATURAL IRISH BOG ORE.
This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.
Samples and Prices on application.
5, PRINCES STREET, PORT GLASGOW.
Telegrams: "Hunter, Port Glasgow."
Established 1872.

NOTICE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, Hereby Give Notice, that a Firm of F. J. Putz & Co., 16 and 17, Great St. Helen's, London, are advertising for sale Incandescent Gas-Light Apparatus called the "Champion" Incandescent Gas-Burner, and are stating in their circular that such Apparatus may be legally sold throughout the United Kingdom without Infringement of any existing Patent.

This is to Give Notice to the Public and the Trade that Actions for Infringement of Patent and for an Injunction will be immediately commenced by the Incandescent Gas-Light Company, Limited, against any persons using or selling such Apparatus.

The validity of the Company's Patents has already been certified by Mr. Justice Romer; and Solicitor and Client costs will be enforced in all cases.

FAITHFULL & OWEN,
11, Victoria Street, S.W.
Solicitors for the Incandescent Gas-Light Company, Limited.

NOTICE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

> "The Incandescent Gas-Light Company, Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo,* **Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—**

> The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others,* **the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.**

(Signed) FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.

NOTICE.

Whereas it has come to the knowledge of the INCANDESCENT GAS LIGHT COMPANY, Limited, of Palmer Street, Westminster, that a Company called the "Meteor" Incandescent Lighting Company, Limited, is selling and offering for sale a form of Incandescent Gas Light known as the "Meteor" Incandescent Gas Light.

This is to Give Notice that the Incandescent Gas Light Company, Limited, will commence actions for infringement of their Patents against all persons found dealing in any manner with the said "Meteor" Incandescent Gas Light which is constructed in infringement of the Patents of the Incandescent Gas Light Company, Limited. The validity of these Patents has been established, and a certificate to that effect has been granted, by the Hon. Mr. Justice Romer.

FAITHFULL & OWEN,
11, Victoria Street, S.W.
Solicitors to the Incandescent Gas Light Company.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an Action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
B Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

BROWNING & ANDERSON'S Patent Double-Acting, Non-Freezing, DEEP LIFT, AND FORCE PUMP.

These Pumps are completely different in construction and principle from all others. They are capable of raising water from 5 feet to 500 feet. It is impossible to draw Air; there being no suction. They have no suckers of any kind, no stuffing-box, no rod working inside the conducting-pipe, but are **double-acting, submerged Pumps,** worked with half the labour and time.

Will Pump Tar, &c., and strongly recommended for Gas-Works.

SILVER MEDALS from the principal Agricultural Societies. GOLD MEDAL, Industrial and Colonial Exhibition, Manchester, &c.

For Particulars and Price List, apply to
R. A. BROWNING, Assoc.M.Inst.C.E.,
Gas-Works, Neath.

TO ENGINEERS & MANAGERS.

ESTABLISHED OVER 50 YEARS.

This is to certify that I, SAMUEL NELSON, am the only ORIGINAL MAKER of the SOLID LEAD SATURATOR, or the CASED SATURATOR.

All Estimates given free for Lead Chemical Burning, and also Contracts for Sulphate Saturators.

Note Address—
20, SPRING GARDENS, BOLTON, Lancashire.
Please write for Estimate before ordering elsewhere.

DAUER – Gasglühlicht

Quality	A.	B.	C
Prime Incandescent Bodies . .	1s.	11d.	7d.
Incandescent Light Burners, with hardened head	9d. each.		

Good Articles, always of uniform make, warranted.

HIRSCH, JANKE, & CO.,
Centrale für Beleuchtungswesen,
BERLIN S.O. Rungestr. 18a.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 $\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) 13$\frac{3}{4}$ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

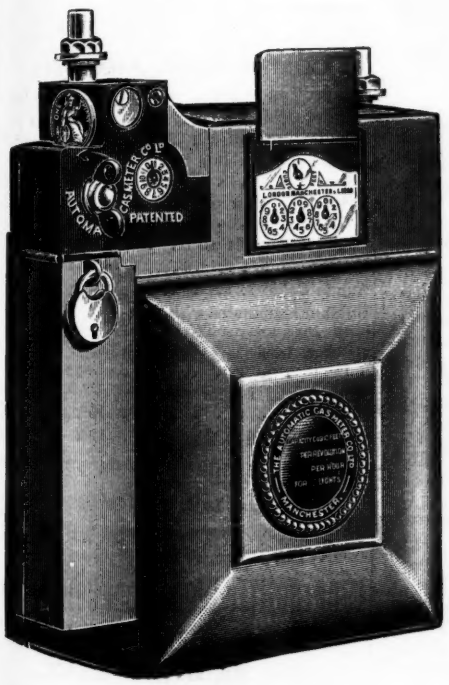
Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13$\frac{1}{2}$ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash . . . . . 1·34 Per Cent.
Tar . . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94$\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

THE AUTOMATIC GAS-METER (1895) CORPORATION LIMITED.



Our Attachment is the Most Simple in the Market.

STRONG, ACCURATE, & RELIABLE.

Notice.

We hold what we believe to be the

MASTER PATENT

for all practical Automatic Gas-Meters.

Our Meters are manufactured under careful supervision, and Materials only of the Best Description are used. Every part of the mechanism is interchangeable; and the whole of the Attachment can be inspected or taken out readily by simply unscrewing the front of box off. Coins in box and Meter Dials must agree together.

The Automatic Gas-Meter (1895) Corporation, Ltd.

Offices and Works:

49, QUEEN VICTORIA STREET, LONDON, E.C.
UPPER BROOK ST., and 41, CORPORATION ST., MANCHESTER.
5, MERRION STREET, LEEDS.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY, LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY, LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON, FITTER.

KENT'S THICK GAS COAL

RAISED AT

The Wharncliffe Woodmoor Colliery,

BARNSLEY.

Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham:—

Specific Gravity (Water 1)	1·276
Weight of One Cubic Foot	79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal	2·68 per cent.
Volatile Matter	35·60 „
Fixed Carbon	58·80 „
Sulphur	0·96 „
Ash	1·96 „

COMMERCIAL ANALYSIS.

Gas per Ton of Coal	11,760 cub. feet.
Gas per Cubic Foot of Coal	418 „
Illuminating Power	17·44 candles.
Value of One Cubic Foot in Sperm	418 grains.
Value per Ton of Coal in Sperm	703 lbs.
Coke per Ton of Coal	1367 „
Coke	61·05 per cent.
Ash in Coke	3·21 „
Sulphur Eliminated with Volatile Products per Ton of Coal	9·4 lbs.
Sulphur in Coke per Ton of Coal	12 „
Ammoniacal Liquor per Ton of Coal	19·7 galls.
Tar per Ton of Coal	12·2 „

R. O. PATERSON, C.E.

Gas-Works, Cheltenham, 8th August, 1894.

For Price, &c., apply to the

Wharncliffe Woodmoor Colliery Co LIMITED

BARNSLEY;

Or to **Mr. W. H. HARVEY,**

17, Old Queen Street, Westminster, S.W.

'680 SPIRIT

FOR ENRICHING COAL GAS,

As well as every other kind or grade of Liquid Hydrocarbons for same purpose are supplied by

S. BOWLEY & SON, Wellington Works, BATTERSEA BRIDGE, LONDON, S.W.

CLAYTON SON & Co., LTD,

MAKERS OF LEEDS

LARGEST GASHOLDER IN THE WORLD

ALSO THE LARGEST METAL TANK

See Advertisement last week, also next week

MAKERS OF RETORT-LIDS OF ALL FORMS & SHAPES BY SPECIAL HYDRAULIC MACHINERY

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS, STOURBRIDGE,

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

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PARK STREET, SOUTHWARK, E.C.,

And at STROUD, GLOUCESTERSHIRE.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

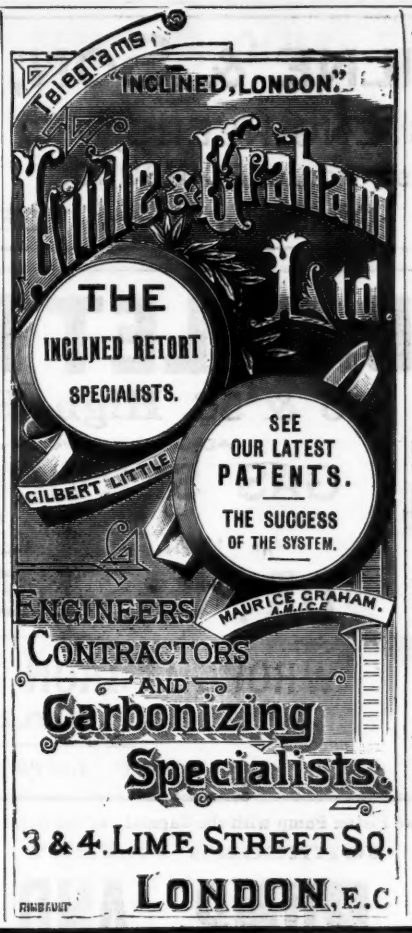
Available output up to 5000 tons per day

Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.



Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

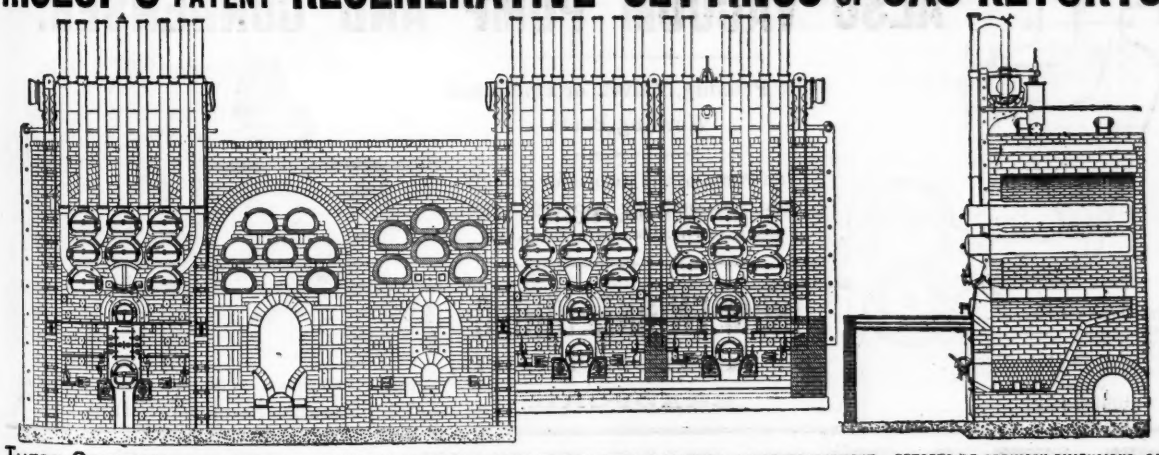
COAL OWNERS, NEWCASTLE-ON-TYNE

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.

Further Information and Pamphlets from Principal Agent.

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MILTON HOUSE WORKS, EDINBURGH.

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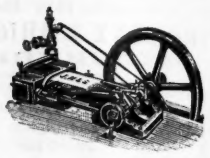

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55 & 56, High Holborn, London.

GAS SERVICE CLEANSERS.

LAMP TORCHES.

DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES & FITTINGS.

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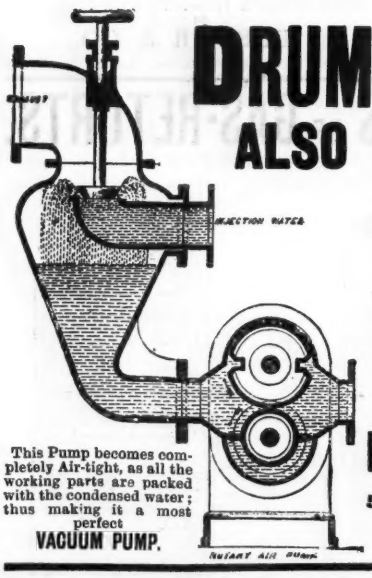
PRICE LISTS ON APPLICATION.

"The Force of the Piston Pump with the Capacity of the Centrifugal combined."

JOHNSON'S PATENT

DRUM PUMP AND EXHAUSTER

ALSO VACUUM PUMP AND CONDENSER.



This Pump becomes completely Air-tight, as all the working parts are packed with the condensed water; thus making it a most perfect

VACUUM PUMP.

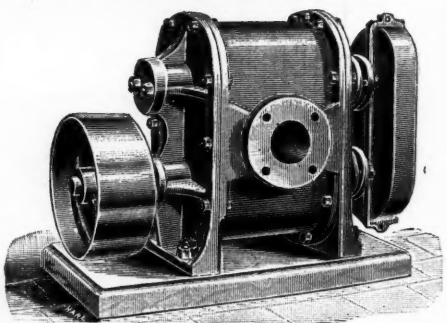
No Priming, Valves, or Frictional Working Parts.

The Pump of the future for quickly and economically moving large Bodies of Water, Semi-fluid, &c.

DRUM ENGINEERING Co.

55, ATHOL ROAD,

BRADFORD.



Blowers and Exhausters guaranteed to give a working pressure of 3 lbs. and upwards, and this without losing power by creating frictional Heat.

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STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

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Contractors for the erection of Retort-Benches complete.

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FLAT-FLAME LANTERNS.

From 30 to 800 Candle Power.

Made entirely of Copper. Best and most durable.

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The "CITY" Lantern.

CHEAP.

HANDSOME.

WELL MADE.

HIGH LIGHTING POWER.

SMALL CONSUMPTION OF GAS.

THE "BRAY" REFLECTING LIGHT.

SIMPLE.

CHEAP.

EFFICIENT.

ECONOMICAL.

REMARKABLE LIGHTING VALUE FOR GAS CONSUMED.

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AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.

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OXIDE OF IRON.

NATURAL BOG ORE FROM OWN MINES.

Samples and Prices on application.

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81, PALMERSTON BUILDINGS, LONDON, E.C.

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GAS AND WATER PIPES

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CASTINGS OF EVERY DESCRIPTION.

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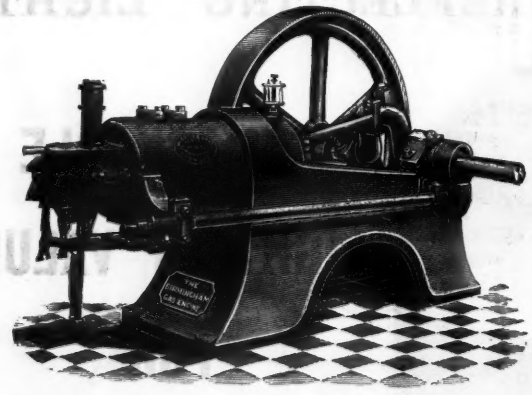
THE BIRMINGHAM GAS-ENGINE

"OTTO" CYCLE.



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GAS CONSUMPTION COMPARES FAVOURABLY WITH THE LATEST MODERN ENGINES.

GENERAL SIZES STOCKED.

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RETORTS AND FIRE-BRICKS.

BEST QUALITY.

KING BROTHERS, STOURBRIDGE.

[See Illustrated Advertisement, Dec. 3, p. 1164.]

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

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MACHINE-MADE GAS-RETORTS.

ARROL-FOULIS

Patent Automatic Machinery

FOR

DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

[See Illustrated Advertisement, Dec. 3, p. 1165.]

J. & W. HORTON

ETNA WORKS,

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NEAR BIRMINGHAM

(Established 50 Years),

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MANUFACTURERS

OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus,

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

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MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brussels	700,000 Cub. Ft.
Belfast	1,700,000 ,,	Liverpool	2,500,000 ,,
Glasgow	300,000 ,,	Tottenham	600,000 ,,
Santiago	400,000 ,,	Brighton	1,250,000 ,,

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft.
Swansea	700,000 ,,	Bath	1,000,000 ,,
Preston	1,500,000 ,,	New York	1,000,000 ,,
Southport	750,000 ,,	Newburgh	350,000 ,,

Tottenham (Second Contract), 750,000 Cubic Feet.

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

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ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
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A SPECIALTY STEEL TANKS FOR GASHOLDERS AND OIL STORAGE.

IMPROVED SYSTEM OF CARBURETTED WATER-GAS PLANT PARTICULARS ON APPLICATION.

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Established 1860.

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Sulphate of Ammonia Plant
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Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
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GEO. PETTIGREW & Co.,
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MIDDLESBROUGH-ON-TEES.

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